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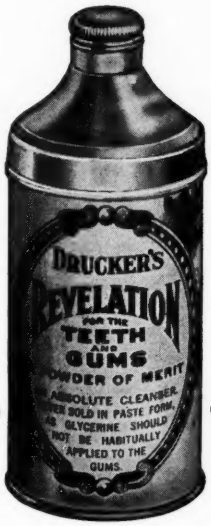

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DR. OREN A. OLIVER, NASHVILLE, TENN.
President, American Society of Orthodontists

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VOL. XV ST. LOUIS, NOVEMBER, 1929 No. 11

ORIGINAL ARTICLES

PRESIDENT'S ADDRESS*

BY W. B. CHILDS, D.D.S., MACON, GA.

SINCE we have gathered again in the state in which our Society was organized and are now entering into the ninth year of activity, it seems that it is not amiss to pause for a moment to review the past eight years, for the lessons of the past may hold something of value that can serve us in the future.

Slightly less than eight years ago, February 2, 1921, to be exact, a small group of Southern orthodontists gathered in Atlanta, Georgia, for the purpose of perfecting the organization of a sectional society to be known as the Southern Society of Orthodontists. Recognition by this group of the growing need for an organization for the interchange of ideas of individuals having mutual interests, and to promote and advance the specialty of orthodontia in the South, resulted in this first meeting of nine southern orthodontists and Dr. William C. Fisher of New York City, who had been invited to come down and assist in perfecting the organization. It was my privilege to be one of this group of charter members of the Southern Society, and it has been with great interest and pride that I have watched its continued growth from year to year.

Each year has been crowded with achievements. From a charter membership of nine men, our Society has increased in numbers, until today we have sixty-nine active members enrolled. Upon this steady growth of membership has depended in a large measure the success of the Society, but of equal importance has been the development and presentation of programs of particular merit. Orthodontia is a rapidly developing specialty; every year we see it advance toward its goal or ideal, namely, the perfection of a science and art that has the greatest significance for the human race.

*Read at the Annual Meeting of the Southern Society of Orthodontists, Macon, Georgia, Jan. 31, Feb. 1 and 2, 1929.

The growth of our Society is significant in that it means that we have earnestly sought to fulfill the purpose of the organization, "the advancement and study of orthodontia as a science." We have not been content to narrow ourselves down to a small group of men sufficient unto themselves, but have reached beyond our sectional boundaries and brought to our meetings some of the most outstanding men of the day. The effect has been twofold, we have broadened our own vision, and we have earned a reputation for progressiveness, so much so that we have attracted men from territories far beyond the boundary lines of our southern states who have become members of our organization.

My reference to the development of the Southern Society is not inspired by a boastful spirit, but rather by that justifiable pride that every loyal orthodontist must feel in whatever tends to advance his profession. Our pride in the accomplishments of this organization should arise from the realization of the fact that through the efforts of many of our members something of value has been added to our scientific knowledge. Orthodontia occupies today a place of importance in dental, medical, and scientific circles, not by any means an undeserved importance. In the development and maintenance of the masticatory apparatus, orthodontia is recognized as a fundamental and clearly defined branch of health service. What several years ago was regarded more or less only as an aid to improved appearance, is today recognized as a science that plays no small part in the physical well-being and happiness of individuals, communities, nations, and humanity, and the building of a better race for the future, for the "growth of the individual mirrors the growth of the race."

It is not within the province of the few words that I have for you to attempt a discussion of the fundamentals of orthodontics, nor can I offer a solution of the problems confronting orthodontists, nor attempt to trace the varied ramifications of the specialty into the collateral sciences. However, as your president, I have not been unmindful of the trust you have imposed upon me, and during the past year my thoughts have been occupied with some of the problems of orthodontia and of this organization. I hope that something of worth may be found in this message and that it may prove of value in the continued progress of our Society.

It is predicted by many leaders that the next great step forward will be in the form of legislation regulating the practice of orthodontia. Already a plan has been proposed in the form of an amendment to the California law which imposes definite requirements and qualifications to be met by applicants to practice orthodontia. The December issue of the INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY, in its editorial columns reprints verbatim this proposed amendment. It seems most timely that we discuss briefly the subject of legislation. Reference to dental literature for many years past will show that the question of some form of regulation for those wishing to specialize in orthodontia has received much attention and has been discussed frequently. And we may be sure that this question may be expected to arise at any time in any part of the country. It is significant in that it seeks to create of orthodontia a new profession, divorced

from dentistry, and to regulate the practice of this science so that special requirements must be met by applicants for license to engage in the practice of orthodontia. It is my opinion that this question deserves our most earnest consideration. We should not rush to hasty conclusions, but rather by deliberate thinking weigh all the facts. We should not form or express opinions upon superficial knowledge of the true facts. It is a fact that specialization today, in both medicine and dentistry, is practically unsupervised except in the field of otolaryngology. The American Board of Otolaryngology was organized in 1924; its chief object was to establish standards of fitness of applicants to practice this specialty and to elevate the standards of otolaryngology. Since its organization there has been a distinct recognition of the value of such a controlling influence in this field. A similar plan for the creation of an American Board of Obstetrics and Gynecology has been suggested in a resolution of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons.

It is readily agreed that before admitting men to membership in orthodontic societies, they should be required to present some evidence of fitness as a specialist. In the president's address before the American Society at Buffalo last year, Dr. Walter H. Ellis referred to this question, and his remarks are worth our study. He suggested a Credentials Committee to pass on the fitness of applicants. Each of these plans seeks regulation without legislation.

I think this question is of sufficient importance to our individual members and to the Society as a whole for us to take one step in recognition of the current tendency in this direction—that is, to appoint a standing committee on legislation to keep the Society informed of any and all legislation that may directly or indirectly affect our members in their practice.

In connection with the question of regulation, let us not lose sight of the fact that the question does not seem so much one of legislation as of education, and the inculcation of high ethical and professional standards and ideals in the minds and hearts of those entering the specialty.

It is unnecessary to refer to the fact that now as never before the question of proper educational training and fitness for the orthodontist is occupying the attention of the men engaged in this profession. Our publications are overflowing with articles and editorials in regard to this feature. Last year, Dr. A. LeRoy Johnson addressed this Society on *The Problem of Orthodontic Education*, and at his suggestion, the Southern Society decided to establish a fellowship at Vanderbilt University as its chief objective for the year. At this meeting Dr. Oliver is prepared to make us a report upon the progress made in regard to this fellowship. It is very gratifying to realize that we have taken advantage of an opportunity to contribute in some way to the solution of our educational problems, and I am sure that this report will engage our most interested attention and appreciation. In working out the plans for this fellowship, we can realize the possibilities of such organizations as ours in the dissemination of knowledge. Through the discussion of our educational problems, we can improve our own conception of the fundamentals of our science.

I am of the opinion that the committee appointed to work out the plans for this fellowship should be continued as a standing committee on orthodontic education. To it could be referred all questions of an educational nature and annual reports could be made of any important developments in this field.

It is my belief that any organization in order to fulfill its true mission must function in some way more than through annual meetings. In other words, it must be a live, working organization for twelve months in the year. It seems to me that we have been getting ready during the past eight years to develop into an organization whose influence will reach beyond the two-and-a-half-day sessions annually and make itself felt in orthodontic circles the year round. Certainly, I do not wish to minimize the importance of the annual meetings or the good that they have accomplished; we have grown and prospered, we have enriched our minds, we have been able to establish impregnable walls of friendship—but we are surely ready for something better than that. We must touch the daily lives of our members if we are to attain the highest possibilities of the Society for the advancement of orthodontia.

I have suggested the appointment of two committees, one on legislation, one on education. I earnestly believe that through the medium of committees, actively functioning, an organization may be able to develop in the broadest sense of the word and to achieve its deserved success. I want to suggest another committee—a committee on research. Probably no other factor is as important today in orthodontia as research. The field offers unlimited opportunities for the solution of our problems, or at least a better understanding of them. My conception of the work that our Society or any other sectional society can undertake in the field of research is to cooperate in every way possible with the American Society of Orthodontists in its research program. "In the nature of things, greatness and unity go together: excellence implies a center." We could probably collect available and desired data which could be referred to men with trained minds having the proper scientific background to carry on work of this order. Any financial assistance from our treasury would result in more benefits to orthodontia if used in conjunction with the funds of the American Society. Inasmuch as we are not in a position to finance a program of research of any extensive degree from our own treasury, we could perhaps make a substantial donation to such programs of the American Society. I believe that the time has arrived when a definite program is desirable, for very little of a meritorious nature can be achieved by haphazard methods or superficial experiments and investigations. Therefore, all these things taken into consideration, it would seem that the logical thing for us to do would be to seek to cooperate with the American Society. In any event, I would like to suggest a committee on research whose duty it would be to consider this question, to confer with the Committee on Research of the American Society, and to present to our Society at its next annual meeting some plan and resolutions as to the part the Southern Society can undertake along lines of research. In addition to this, I think a résumé of the year's accomplishments would be most fitting to include in this committee's report.

It seems a coincidence that each of the five men composing the original Research Committee of the American Society of Orthodontists, namely, Drs.

Albert H. Ketcham, Milo Hellman, A. LeRoy Johnson, Lloyd S. Lourie, and Martin Dewey, are in attendance at this meeting, and it affords me great pleasure to be able to announce that at this afternoon's session Dr. Ketcham has consented to present some of the results of Dr. Marshall's research work at the University of California.

Heretofore, with the exception of the sessions at Baltimore last year, we have been passing by the opportunity to perpetuate the records of our meetings. I believe that in the future we should have our proceedings recorded annually. Unless this is done, much valuable material will be lost. Obviously such a record would be of no advantage merely for the minutes of our Society when it would not be possible to refer to it again at will. If it is not practical to publish these proceedings in pamphlet form each year, they can be compiled annually, and at the end of three years these proceedings may be published in bound volumes at the expense of the individual members. In this way, we would be preserving, for all time and for convenient reference, the splendid subject matter presented each year.

In conclusion, first let me supplement the welcome that has already been extended. My earnest hope is that you will find in your visit here a great deal of profit and pleasure. We have endeavored to do everything possible to make your stay happy, not from any desire to advertise to you the advantages and hospitality of Macon, Georgia, but from a real desire to make this meeting a delightful memory for all time.

We are honored today by the presence of some of the most outstanding men in our profession. I have already referred to Dr. Albert H. Ketcham being with us. It is a pleasure and honor to have the president of the American Society of Orthodontists in attendance. Dr. Ketcham has travelled a long way to be with us today, and this makes his presence the more appreciated. We are also delighted to have many other distinguished guests this morning.

We realize the demands made upon the time of the essayists and clinicians, and we are grateful to them for having so graciously given their time to us during this meeting.

For the splendid program for this meeting, we are indebted to the untiring efforts of the Board of Censors. Throughout the entire year the Board of Censors has worked on the plans for the program. Dr. Mott, as chairman, made two trips to Macon in the interest of the program, sacrificing his time to do so. The high quality of the material offered attests the success of the efforts of the Board of Censors. I want to mention especially Dr. C. C. Howard and thank him for his keen interest and cooperation in the plans for the meeting. I am sure that Dr. Howard had no idea I would refer to this, but he has rendered such valuable assistance that I cannot pass by the opportunity to express thus openly my appreciation.

For your entertainment and diversion, we have prepared a program of recreation which we hope will leave no dull moment during your stay in Macon. To the members of the Sixth District Dental Society, I want to extend my sincere thanks for their assistance in working out the plans for the entertainment. To Dr. R. H. Murphy, secretary, and to Dr. R. Holmes Mason, general chairman, I owe especial thanks. They have worked constantly and

cheerfully to the end that this meeting should be a success, and I am indeed grateful for their efforts. Each individual member of the Sixth District Society has cooperated with us in our plans and has endeavored to render all assistance possible in carrying them out.

And finally, let me say to you how deeply grateful I am to the Southern Society of Orthodontists for the honor you have conferred upon me in electing me your president. I do not count it a small or nominal honor to have been elevated to this office, and the memory of this year will remain always one of the happiest of my professional experience. The loyalty of the officers and committees, and their cooperation, and the expressions of confidence of the individual members have been with me during the past year and have helped me at all times. To all of you I wish to say from the bottom of my heart, "I thank you."

EVOLUTION AND DEVELOPMENT OF THE TEMPOROMANDIBULAR ARTICULATION*

By Martin Dewey, D.D.S., M.D., New York, N. Y.

OUR reason for selecting this subject for the paper is because the temporomandibular articulation seems to be very much misunderstood. Only recently in reading the galley proof of three papers presented by three men, each prominent in the orthodontic profession, I could not help believing that the statements made in these papers in regard to the temporomandibular articulation were the result of a misunderstanding. We believe that if the majority of those in the orthodontic profession had a proper conception of the evolution and development of the temporomandibular region, we would have a much greater uniformity in statements relative to this subject and a much more uniform treatment in certain types of malocclusion.

In considering the evolution of the temporomandibular articulation, you must take into consideration the fact that the development of the dental apparatus for the temporomandibular articulation as found in man is the result of functional adaptation of the parts, which changes were brought about by the occlusion of the teeth. If you will notice the dental apparatus of a shark, you will find that the mandibular and maxillary tooth-bearing elements articulate with each other. You will also find in the preparation of a skull of a shark (Fig. 1) that it is very easy to separate the tooth-bearing or dental apparatus from the cranium. In other words the dental elements and the cranium are not firmly attached, and the analogous structure to the temporomandibular in man is between the upper and lower tooth-bearing structures. The posterior end of the mandibular arch, which is cartilaginous, articulates with the posterior end of the maxillary structure, which is also cartilaginous.

*Read before the New York Society of Orthodontists New York City, December, 1928, and the Southern Society of Orthodontists, Macon, Ga., Jan. 31, 1929.

In passing from the dentition of the shark to that of man, notice the radical change. We find the posterior end of the mandible is articulated not with the maxillary dental elements but with the cranium. The only relation between the maxilla and the mandible in man (Fig. 2), so far as contact or articulation is concerned, is through the occlusion of the teeth. We find that the occlusion of the teeth and the resulting muscular activity have been responsible for the change and location of the temporomandibular articulation of man as compared to the shark. Various changes have occurred during the progress of evolution, as we pass from the fish to the reptiles and on to the mammals. We notice that the functional demands have produced a great

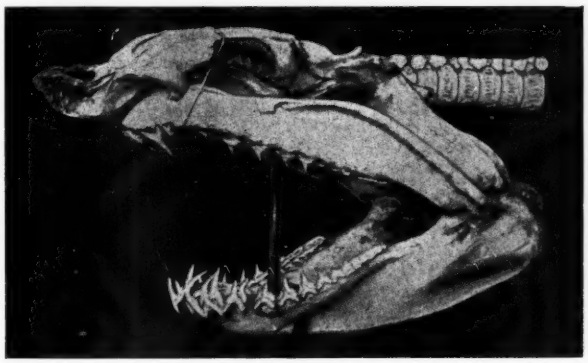

Fig. 1.

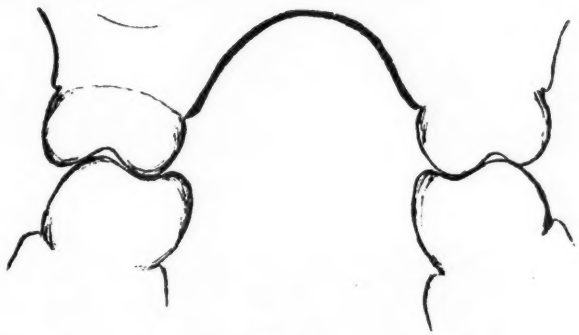

Fig. 2.

variation in the temporomandibular structures. For example, we find in the snakes a highly developed temporomandibular articulation, which really is a double joint allowing for extreme lateral expansion of the two lateral halves of the mandible for the purpose of deglutition. In fact the dental apparatus of snakes, with the exception of nonpoisonous snakes, is built for the purpose of prehension and deglutition only. The temporomandibular elements are modified for those purposes (Fig. 3).

I might also mention in connection with the snake, as will be shown later in other specimens, that the ramus or the posterior end of the mandible articulates with an entirely different structure from the posterior end of the mandible as you find it in man. It can be readily seen that there is a joint between the dental part and the posterior end of the mandible that does not exist in man. The posterior end of the mandibular elements has been lost as

we pass from reptile to man in the study of evolution. The dentary portion has increased in size, and a new condyle and ramus have been found. These changes were brought about by functional demands, and we find other interesting changes that occurred in response to functional demands.

In the crocodile and alligator (Fig. 4) we find that the greatly elongated mandible and maxilla have made it necessary for the animal to open the mouth by moving the maxilla. Here as in the shark, the dentary structures

Fig. 3.

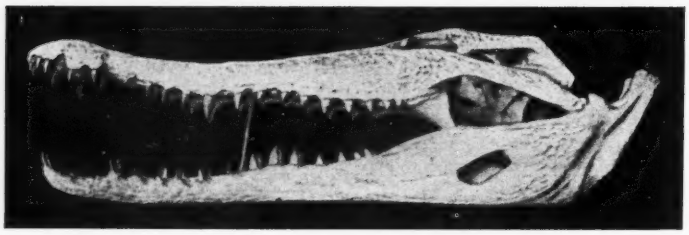

Fig. 4.-*A*.

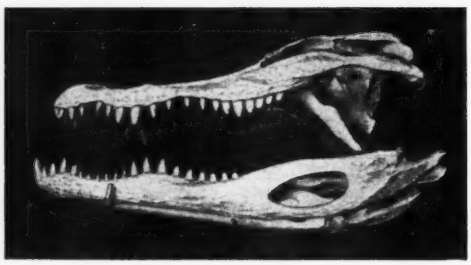

Fig. 4.-*B*.

are much larger than the cranial structures. The cranium is forced to move with the maxillary bone, and, when the animal opens his mouth, it is the maxilla that moves, not the mandible. Therefore, anatomic relations have been reversed, and we might say that the ramus and the condyle are on the maxillary arch and the glenoid fossa is on the mandible. As a matter of curiosity, if you will turn the illustration of the crocodile upside down, you will see that the mandibular elements look very much like the maxillary elements that are found in some other animals. The opening on the body of the mandible is

produced by the muscles of mastication which break through from the inside to the outside and might easily be mistaken for the orbital cavity by the inexperienced observer if the skull was turned over. We mention this peculiar arrangement because it demonstrates that not only the condyle but also the temporomandibular articulation has been the result of functional adaptation, and the influence of this function has manifested itself on all parts of the face and cranium.

I know of no better illustration of the gradual evolution of the mandible and the temporomandibular articulation than the illustration used in the paper by Dr. William K. Gregory, "The Palaeomorphology of the Human Head," published in the INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY, February, 1928. This paper illustrates ten structural stages from fish to man. In Fig. 5 the skull is of a very primitive fish, and it will be noted that several cranial and facial elements are included that are

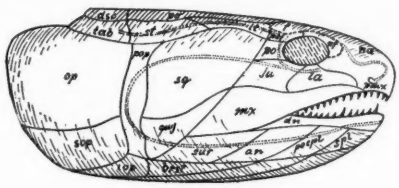

Fig. 5.

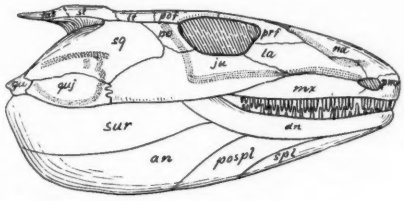

Fig. 6

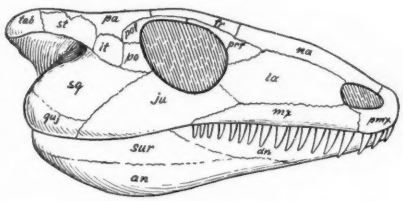

Fig. 7.

not found in the human face. The following paragraph from the above mentioned paper gives the series of elements included:

"In these primitive fishes (Fig. 5) the dermocranium included the following series of elements: (1) roof bones on or near the mid-dorsal line, covering the nose, eyes, pineal organ and hind brain; (2) the maxillary series, including the premaxillae and maxillae of the upper jaw and the dentary or inferior maxillary of the lower jaw; (3) the circumorbital series of five plates around the eye; (4) the temporomandibular series; in the skull these plates, consisting chiefly of the squamosal and quadratojugal bones, cover the temporal region; they protect the upper jaw muscles and the back part of the primary upper jaw or pterygoquadrate. In the lower jaw this series includes the plates lying immediately behind and beneath the dentary, namely, the infradentaries or splenial, postsplenial, surangular; (5) the opercular series, covering the branchial chamber and the floor of the mouth."

It will be noticed by studying the illustration that the mandibular portion contains part of what might be termed the mandibular series in addition to

the temporomandibular series. It will be observed that squamosal and quadratojugal bones cover the temporal region and protect the maxillary muscles. In other words the muscles of mastication are covered by bony plates which begin to be lost in the reptiles. We also find that lying behind the dentary bone, which is replaced by the mandible of man, is the interdentary or splenial, postsplenial and surangular. In other words the temporomandibular articulation is made up of a number of bones, some of which lie on the outside of the muscles of mastication, and which are disappearing as the dentary bone increases in size.

Fig. 6 is of an amphibian of the Lower Carboniferous ages. These amphibians still possess many of the characteristics found in the maxillary and temporomandibular series of the fish. You will see that the dentary bone is still small and that the splenial and postsplenial, the angular and surangular can easily be outlined. In Fig 7 we find many of the amphibian characteristics

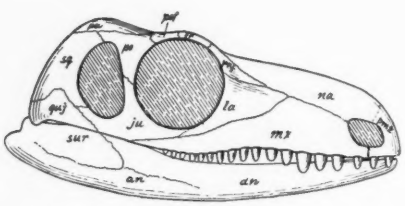

Fig. 8.

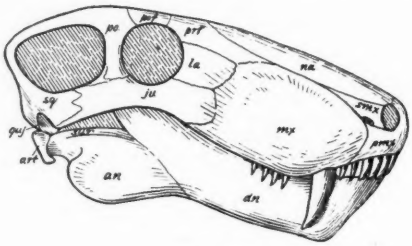

Fig. 9.

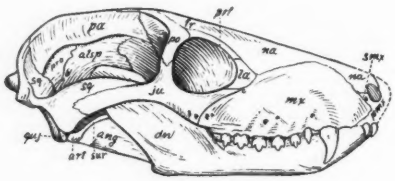

Fig. 10.

still retained. The dentary has increased in size, the splenial and postsplenial seem to have been lost, and the angular and surangular have remained. The squamosal and quadratojugal have remained to cover the muscles of mastication. The muscles of mastication have not as yet broken through the bony covering. In the fourth stage (Fig. 8), represented by the theromorph reptiles of the Permian of Texas, the maxilla is beginning to grow upward, and the lachrymal has lost its extension to the nares. It would be interesting to consider the evolution of the nares and the effect it has had on the lachrymal bone, but time will not permit us to depart thus from our subject. We wish to emphasize the fact that the maxilla, the dentary bone and the mandible have increased in size. We find the angular and surangular bone still present but greatly reduced in size as compared to Fig. 7.

We find that these are changing rapidly because in the theromorph reptiles the jaw muscles are beginning to break through the temporal elements which cover them by a process of natural trephining. The outer margin of this bony opening becomes strengthened and builds up a support.

Fig. 9, the fifth stage, is one of the mammal-like reptiles from the Permian of South Africa as described by Broom, Watson and other writers. Here the maxilla has already become the dominant element of the face. Each bone has been greatly reduced in size, and the jugular bone has been influenced by the muscles of mastication. The temporal fossa has been enlarged, and the surrounding bars of bone stand in clearer relief, and we recognize easily the beginning of the mammalian zygomatic arch. In the mandible the dentary sends upward and backward a strong process which overlaps the surangle. This upper projection can be easily recognized as the beginning of the development of the ramus of the mandible as found in mammals. We might state that the angular and surangular in these higher reptiles are closely related to the posterior end of the mandible, and the articulation with the squamosal is at a point internal to what will be the temporomandibular articulation in mammals.

The upward and backward projections of the dentary are on the outside of the angular and surangular and will develop a further projection which will then allow the dentary to reach back to the temporal region, and a new articulation will be established and the old one lost by elimination of the

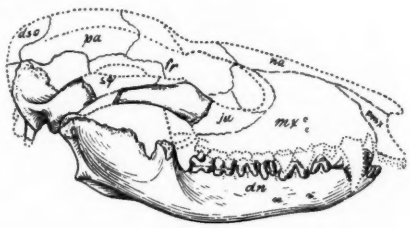

Fig. 11.

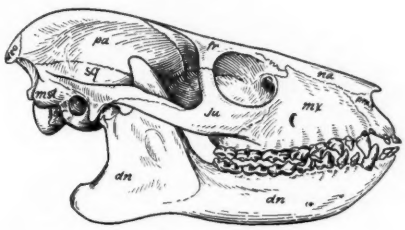

Fig. 12.

angular and surangular structures as it now is in Fig. 9. Fig. 10, in the sixth stage, is one of the smaller cynodontes from the Triassic of South Africa. We notice that the maxilla dominates the facial element, and the temporal fossa is almost wholly mammalian in type. The squamosal bone has developed forward and downward to the jugular. The lachrymal has been greatly increased in size. The backward projection of the dentary has continued because of the action and function of the muscles of mastication which are now assuming much more importance than they had in the earlier stages. The angular and surangular are still present; also the angular, surangular and articular, together with the quadrate bone of the maxilla, are much reduced in size in comparison with those of earlier skulls.

Dr. Gregory states: "The most progressive cynodontes of the Triassic in many characters approach the more primitive carnivorous marsupials of the present time, especially in skull structure. But between them and the well-known placental mammals of the beginning of the Eocene epoch lies a vast gap of at least several million years in duration. During the long ages in which the dinosaurs flourished, the mammals remained small and inconspicuous and left as fossils tantalizingly few teeth and jaws and hardly any skulls. A few years ago Mr. Barnum Brown of the American Museum of Natural History found embedded under the skull of one of the great dinosaurs of the

Upper Cretaceous the fossil skull and jaw of a small mammal (Fig. 11) which has proved to be closely related to the existing opossum. Solely upon anatomic evidence it has long been recognized that the opossum is one of the most conservative types of mammalian-living fossils now extant, and that in fact it has preserved most of the essential characters of a pre-placental Mesozoic mammal. Hence it is significant to observe that in the lateral aspect of the skull the Cretaceous and modern opossums retain a strong fundamental resemblance to the most progressive of the mammal-like reptiles."

It will be observed that in this specimen (Fig. 11) the dentary portion has continued backward and made a contact with the temporal region. The dentary is the only element which is now present, and the articular, angular and surangular have disappeared. We now have the same temporomandibular elements as found in modern mammals.

Fig. 12 is of a primitive primate; Fig. 13 is of a chimpanzee; Fig. 14 is of a man. In studying Figs. 11, 12, 13, and 14, it will be observed that the tem-

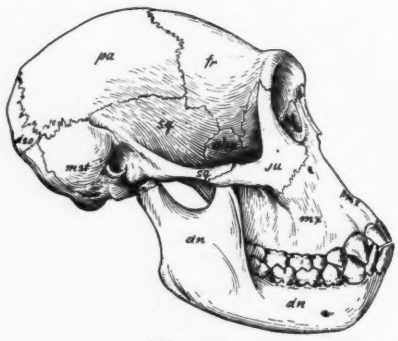

Fig. 13.

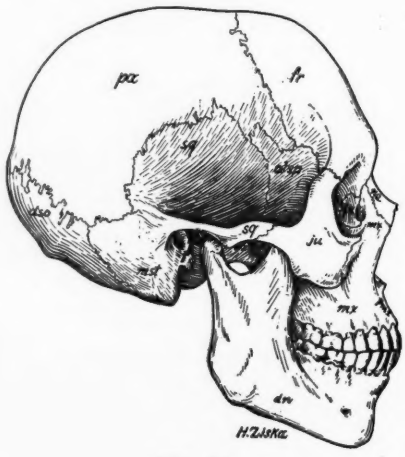

Fig. 14.

poromandibular region, which was originally associated with the muscles of mastication, has changed very little in shape and not at all as regards relation. In other words the newly formed condyle in the primitive mammal has become the persistent condyle for the millions of years that followed.

Changes have been the result of function in the mammals, and this can be illustrated by a few startling examples. In the beaver we find a characteristic type (Fig. 15). Function has made necessary a wide range of mandibular movements. The shape of the teeth has influenced the shape of the condyle, but the position of other anatomic structures has not changed. In the carnivorous animal (Fig. 16) we find that function has made necessary a vertical movement of the mandible with the result that the condyle has been changed in shape, but the relation of the condyle to the temporal elements has not changed from that found in the primitive mammals.

In herbivorous animals (Fig. 17) we find the antelope a good example as to change in the condyle in relation to use and function without any change in position. As a result of this we can form the following basic law: The shape of the condyle is influenced by the shape and form of the teeth. The

movement of the mandible is influenced by the shape and form of the teeth, and as a result of this movement, the shape may change, but the position of the condyle and ramus as related to the other anatomic structures does not change.

This then brings us to the part of the paper which is a discussion of that which is of vital importance to orthodontia, namely, To what extent do different types of malocclusion affect the temporomandibular articulation in man? Only recently in reading galley proofs of articles and papers to be published

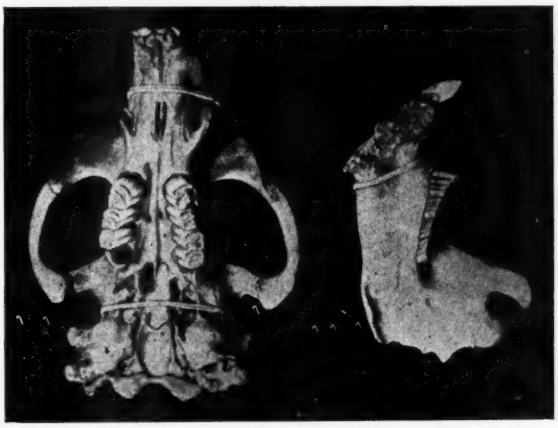

Fig. 15.

Fig. 16.

in the INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY, I came across statements which seemed to be at variance with anatomic facts. These papers implied that in posterior occlusion the condyle occupied a more posterior position to the face and cranium than it did in normal occlusion; which might also be implied to mean that in anterior occlusion the condyle would be too far forward.

I was surprised to hear such ideas sponsored by modern orthodontists, because we had considered for a long time that the temporomandibular articulation was a fixed structure as regards anterior and posterior position as related to malocclusion.

Fig. 17.

Fig. 18.

Our opinion was formed, first, on the evolutionary facts which we have given, and second, several years ago while associated with Dr. E. T. Skinner of Kansas City, he made many investigations of the shape and form of the condyle in anterior and posterior occlusion cases, and we became convinced that the temporomandibular articulation was a permanent arrangement as regards anatomic structure and position. In other words the condyle does not wander forward and backward with the various types of malocclusion. In order to get further information about this fact, I explained this to Dr. Riesner who took x-rays of the temporomandibular articulation of all types of malocclusion. While this has gone on for several months, it substantiated what Dr. Skinner found in Kansas City fifteen years ago, that the temporomandibular articulation is a fixed structure as regards anterior and posterior occlusions.

Fig. 19.

Dr. Riesner has never found a case which is too far posterior in posterior occlusion, or too far anterior in anterior occlusion. We have prepared an exhibit of these films which you can study at the close of this paper.

Our next line of investigation is to deal with the study of skulls. We have never found a skull with anterior or posterior occlusion which showed the condyle too far forward or too far backward. Fig. 17 shows a skull with a normal occlusion and a normal temporomandibular articulation. In considering the positions of the condyle, it is well to remember the relation that exists between the shape of the teeth and the shape of the condyle and glenoid fossa.

Fig. 18 is a skull showing distoclusion. The condyle is in the same relation to the glenoid fossa and tympanic plate as it is in the previous illustration.

Fig. 19 shows a skull with an anterior occlusion in which the condyle again is in the same relation as in the other two illustrations. It will be noticed that

the development of the mandible and maxilla differs in these three skulls, and the great change in the mandible lies in front of the region covered by the muscles of mastication. In anterior occlusion cases the neck of the condyle may be elongated, and the ramus may be elongated more than in posterior occlusion cases, but the anterior-posterior position of the condyle is the same.

In a paper presented by A. L. Johnson before the American Society of Orthodontists at Atlantic City, he stated that as a result of his investigations he had found the condyle was in the same position in all types of malocclusion. If the condyle is not influenced by different types of malocclusions, it should always occupy the same position, and we believe that any type of orthodontic treatment tending to change the position of the condyle is objectionable. We believe the best results can be obtained by devoting our efforts toward changing the defective parts and by leaving normal structures as they are.

SOME FACTORS THAT INHIBIT AND ACCELERATE GROWTH IN CHILDREN*

By Benjamin Bashinski, M.D., Macon, Ga.

MANY factors accelerate and inhibit growth in children, and chief among these are the pineal or pituitary gland and the thyroid gland.

In pineal tumors we find an abnormal development and an associated sexual precocity. The experimental removal of the pituitary will cause a deposition of fat and a persistence of deciduous dentition. Changes in the form and size of the teeth are caused by the influence of disturbance of the pituitary gland, associated with disturbance of the thyroid gland.

The pituitary body is composed of three parts, the anterior lobe, the intermediate portion and the posterior lobe, the anterior being glandular in construction; the intermediate, which as a rule is grouped with the posterior, is nerve tissue in origin. Tissue growth, especially the skeleton, is associated with the anterior lobe. An overactive anterior lobe will cause a most marked change in the bones.

H. Gardiner Hill and J. Forest Smith reported the effects of feeding extracts of the anterior lobe of the pituitary to children. The observations extended over a period of one year. In cases of infantilism, where the epiphyses are not already fused, these extracts appear of value in influencing growth.

In a deficiency of the thyroid hormone, skeletal changes are usually marked and set in very early.

The long bone shafts show narrowing. The skull is thickened and the entire facial bones are undeveloped, producing a saddle nose and prominent forehead. The mandible is gracile, the milk teeth appear late and may be persistent, the permanent teeth are small, are located abnormally, decay early and erupt late. The bony development and epiphyseal closures are far below the normal.

If the thyroid gland is injured in any way during childhood so that the secretion is diminished, there will be delay in growth as well as in mental development.

Doctor Barker describes the symptoms very clearly when the parathyroid glands are removed or made insufficient in function by disease. Tetany develops with its tonic spasms. In chronic cases profound disturbance of nutrition manifests itself as alterations in the enamel of the teeth (little black lines of enamel defect run parallel to each other across the teeth). Patients are irritable and tire easily.

Doctor Barker also states "that, though the rôle of internal secretions in growth and development is undoubtedly very important, the subject is so

*Read before the Southern Society of Orthodontists at Macon, Ga., Jan. 31, Feb. 1 and 2, 1929.

extremely complex and the interrelationship of the glands is so little understood that as yet we can do little more than guess as to the exact disturbances that may be responsible for individual types."

Hyperplastic adenoid tissue leads to nasal obstruction and other clinical manifestations. In older children hypertrophic adenoids lead to mouth-breathing and faulty configuration of the face. Obstruction to respiration will cause a thoracic deformity due to a great strain upon the diaphragm and an associated retardation in general growth.

Inheritance plays a most important factor in the acceleration and inhibition of growth in children. Dr. Clarence C. Little quotes Davenport in 1917 on inheritance of stature in man. Among his general conclusions are the following: The offspring of two tall parents are less variable in stature than those of two short parents. When both parents are tall or very tall practically all of the children are tall or very tall. When both parents are very short or short and of short stock, all children are short or very short. Short parents may and frequently do carry germ cells which lack the shortening factors, while in tall parents the gametes are more nearly homogeneous and all lack most of the shortening factors.

Some symptoms of nervousness are very often accompanied by faults in the physical development of the child. Defects assume many forms. Some nervous children are marked by a persistence in later childhood of certain infantile characteristics of the build and shape of the body. We see the rheumatic type of child, with chorea, or a child that is listless. Again, we meet with hysteria.

In the nervous system conditions are different from those we find in the muscular system. We find in skin, bone and muscle new cell elements constantly being formed. The life of the individual cell is relatively short. On the other hand, in the nervous system the individual cells are long-lived. Many are deprived of calcium, and this may explain the increased irritability of peripheral nerves and a tendency to convulsive seizures of all kinds, as tetany, carpopedal spasm and laryngismus stridulus or child crowing. They lag behind in physical development, are dull at school, speak badly and are lacking in coordination. In many nervous children, we find a lack of tone in skeletal muscles, and many of them have a lordosis.

Tables of average weight and heght measurements at various ages are tables of averages and are very often misleading. One cannot reasonably expect all children to conform to the figures as given us. They differ in height and weight as do adults. Inheritance plays a large part in the height and build. Well-to-do children have more nutritional disturbances than those less financially favored.

Growth involves the synthesis of a variety of chemical compounds in due proportion and succession to each other, and this process does not take place with uniform velocity throughout life. The growth of children takes place in spurts.

Influence of race and environment plays an important part. Robertson states that the intimate dependence of the growth of normal infants upon environment, race and sex at once reveals the fact that there is no single

standard of infantile development which will be applicable to the average infant of either sex, of differing racial stock or to varying environmental conditions. Robertson also quotes Macgregor who states that the latter half of the first year of extrauterine growth is in reality a critical period in the development of man. He states that children who fall victims to zymotic diseases during the second half of the first year of extrauterine life, tend to be of markedly subnormal weight before any loss of weight due to the disease itself has occurred; and the incidence of measles, whooping-cough and scarlet fever reaches a maximum at the eighth and ninth months, while diphtheria and cerebrospinal meningitis, although occurring rarely during the first year, show a maximum at the sixteenth and seventeenth months.

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AN APPRECIATION OF MILO HELLMAN'S WORK*

By William K. Gregory, Ph.D., New York

TO WRITE an obituary notice of a great man who is dead is a sad duty, to write a biographic note of one who is just entering the highest plateau of middle life is both a privilege and a pleasure. As I look over the long file of Hellman's papers, I am impressed by his extraordinary patient and persistent search for fundamental facts and principles in the study of occlusion and malocclusion.

The genesis and development of his leading ideas would form an interesting chapter in the history of the science of orthodontia. He came into the field of dentistry from an unusual angle, after having achieved an honorable place in the art of music. In this his hands were trained for delicate manipulations, and his mind was opened to the value of small differences; he learned also how to articulate his own efforts with those of others and how to combine small units into beautiful wholes. All of these qualities have doubtless contributed to his success in the practice of the art of orthodontia, but they are equally discernible in the fruit of his labors in pure science.

As a musician, Hellman was oppressed with the dread of the culdesac, and it drove him out to seek a broader field. And as a student of dentistry and finally of orthodontia, he was filled with that form of the devil of unrest which animates the noble army of doubters, heretics, schismatics, inventors, discoverers and other pathfinders of the human spirit. At the same time his

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love of the classical in music saved him from being a radical, and through his eminently practical sense he strove to prove all things, to make haste slowly and to hold fast to that which is good.

Take, for example, his reaction to the central topic of orthodontia, which is malocclusion and its correction. Eagerly his mature mind accepted the beautiful classification of malocclusions that was achieved by Doctor Angle and which still remains the foundation of orthodontic belief and practice. Here was a static ideal, a system once for all revealed to mankind. To the pioneers of dentistry Adam was endowed by the Creator with a perfect occlusion, and for us that should be enough. But, mused Hellman, what if Darwin was right? Suppose we are descended from lower animals, as Doctor Angle's stimulating assistant, Doctor Raymond C. Osburn, consistently taught? By what steps then did "Old Glory" come by his beautiful dental and mandibular arches and his 100 per cent occlusion?

This disturbing thought drove Hellman into a long series of laborious researches: first on the significance of normal occlusion, then on the form of the dental arch in anthropoid apes, in primitive man and in civilized man, next on the possible relations between the size and form of teeth and the form of the dental arch, then on the history of the occlusal relations of the maxillary and mandibular molars in prehuman mammals. This last problem brought Hellman into close cooperation with the present writer at the American Museum of Natural History, where many years before those great leaders, Professor E. D. Cope and Henry Fairfield Osborn, had glimpsed the main stages in the origin and evolution of the human molar teeth. These pioneers had had all too scant material for anything but a general outline of the subject, but the vast and growing treasures of the museum, including fossil lemuroid primates from the Eocene epoch of Wyoming, fossil anthropoid primates from the Miocene of India and the famous Von Luschan collection of recent human skulls, all made possible a more detailed and thorough treatment of the subject of the evolution of the human dentition, as set forth in the various papers by Hellman and Gregory on the dentition of *Dryopithecus* and on the occurrence of the *Dryopithecus* pattern in human mandibular molars.

Among the practical results of these studies to the orthodontist we may note the fact that the occlusal relations of the lingual cusps of the maxillary and mandibular molar teeth were, from the evolutionary viewpoint, better and more stable landmarks than the more variable relations of the buccal cusps, upon which attention had hitherto been too exclusively centered. It is perhaps too early to say how far the evolutionary viewpoint will eventually lead to a modification in the daily practice of orthodontists, but the great interest which the profession has manifested in this aspect of Hellman's researches shows that orthodontists look to a knowledge of the evolution of normal occlusion as a valuable adjunct to a practical knowledge of its opposite, malocclusion.

But Hellman has not been content to assimilate the results of modern paleontology and comparative anatomy on the evolution of dental arch and tooth form. He has at all times striven to keep abreast with advances in knowledge of those physiologic processes of bone resorption and reformation

which alone make possible the favorable movement of the malposed tooth under the stress of the appliance. This again has made him a keen observer of the forces of growth and differentiation and has led to a series of papers in which the effort has been made to describe graphically and statistically the stages of growth and differentiation of the body as a whole, of the skeleton, of the face, of the jaws, and of the teeth.

Long ago Hellman's researches led him to appreciate the great central fact of physical anthropology, which is *normal variability*. Through his labors the fixed standardized "types" of the older textbooks have been shown to be mere artificial makeshifts. Sooner or later every orthodontist must grasp the significance of *normal variability* or take the consequences. In all this field Hellman has had the benefit of the counsel and guidance of the famous anthropologist, Professor Franz Boas of Columbia University.

Racial differences in skull and tooth form early began to engage Hellman's attention, but apart from a few important but brief papers the greater part of his material in this line is still unpublished. Even so, the value of Hellman's work is so clearly recognized that some years ago he was appointed research associate in physical anthropology in the American Museum of Natural History, where he has long worked on the great collections of human skulls of all races.

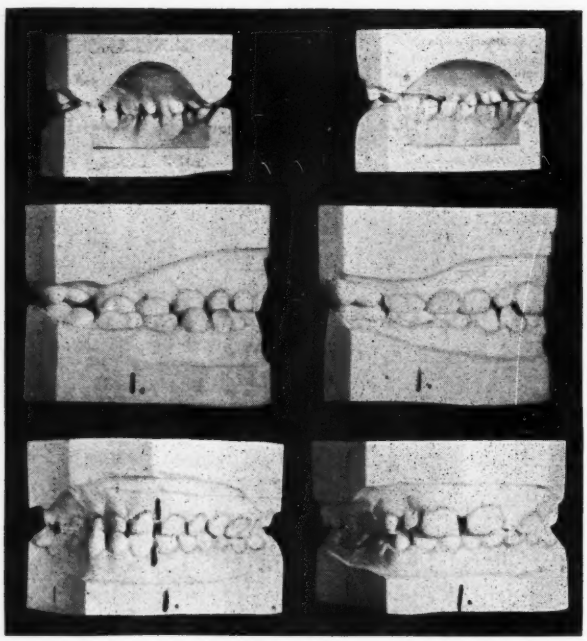
In the democracy of science the party of the opposition is no less important than in the democracy of government. In the field of orthodontia Hellman has frequently been a leader of the opposition. For many years he has steadily opposed static ideals of occlusion and mechanical concepts of complex biologic phenomena. He has taught unceasingly that the artist is more important than his implement and that the variability of nature must first be offset by increasing our biologic knowledge rather than by multiplying our apparatus. It would not be appropriate for an outsider to express an opinion on this matter. But it may be said that Hellman has never left his opponents in doubt either as to the sincerity of his opposition or as to the extent and nature of the evidence brought forward by him. All honor then to his sterling integrity of spirit and to his high originality and resourcefulness. May he live to see the successful drawing together of all his researches on the evolution, growth and differentiation of occlusion and on the classification, diagnosis and treatment of malocclusion, into one great textbook of orthodontia.

The proneness to suppose in nature greater order and regularity than there actually is; the tendency to support a preconceived opinion by affirmative instances, neglecting all negative or opposed cases; and the tendency to generalize from few observations or to give reality to mere abstraction,—figments of the mind!

TRIMMING DECIDUOUS TEETH TO AID NORMAL ERUPTION OF PERMANENT TEETH OR ASSIST IN CORRECTION OF MALOCCLUSION*

By Dr. Lloyd S. Lourie, Chicago, Ill.

THE procedures suggested by this title and to be explained in the paper may not be new to you, as I have used some of them for a good many years; and it is possible that others may have found them useful. However, I do not recall any papers on the subject or any open discussion of it. A conversation with a well-known orthodontist seemed to indicate that such a discussion might



Case 1.

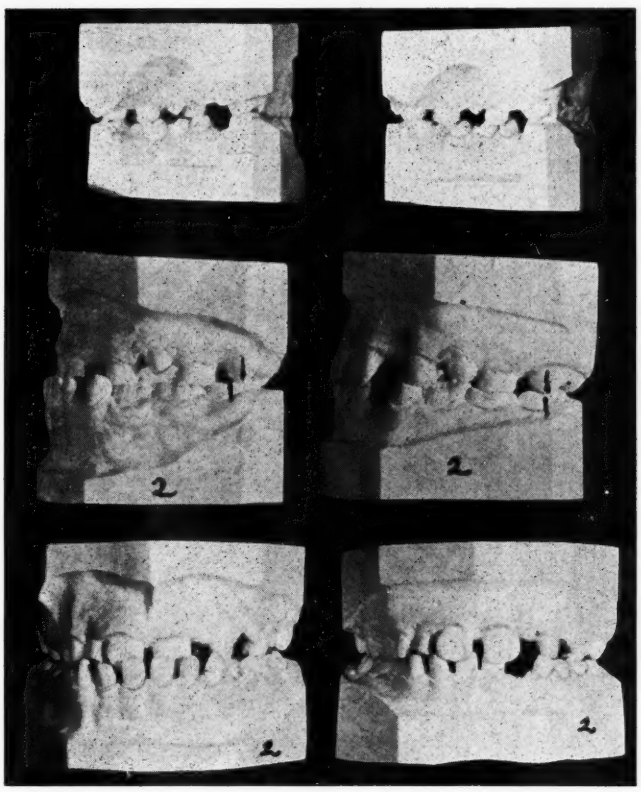
be advisable. Having mentioned to him the occlusal trimming of deciduous canines, he replied, "I am glad to hear you have been doing that as I have also, but I hadn't the nerve to tell anyone about it." This remark suggests possible criticisms, but in selected cases, trimming at the proper time seems to have advantages that greatly outweigh the objections.

Two kinds of trimming will be considered; occlusal and approximal, the occlusal being particularly of the deciduous canines, though sometimes of the molars, while the approximal is confined entirely to the second deciduous molars. Considering the first group, deciduous canines may be in supra-version, or worn at wrong angles, thus preventing normal occlusion or tending

*Read before the Southern Society of Orthodontists, Macon, Ga., Jan. 31, Feb. 1 and 2, 1929.

to increase malocclusion. In addition to causing malocclusion of individual teeth, the mandible may be displaced laterally (Case 1), forward (Case 2), or the mandibular dental arch held in distoclusion as in (Case 3). At first these positions may be transitory, but they tend to become fixed and so should be corrected promptly, though not necessarily by mechanical appliances. At some stages of dentition, orthodontic movement simply hastens the shedding of deciduous teeth without any beneficial effect on the permanent ones, while trimming may remove the chief obstacles to normal occlusion, at the same time leaving the deciduous teeth for function and guides to occlusion.

In Case 1 there was a unilateral crossed-bite with slight lateral displacement of the mandible; all of which was automatically corrected by natural



Case 2.

forces after occlusal trimming of the deciduous canines and molars. Lingual view shows permanent molars assuming same malocclusion as deciduous teeth.

In Case 2 the mandible and mandibular teeth were being forced forward by the interference of the maloccluding deciduous canines. Occlusal trimming of these teeth together with the second deciduous molars on the left side allowed natural forces to correct the occlusion as shown, in four weeks' time without any mechanical assistance. Lingual view shows distoclusion of permanent molars.

In Case 3 the chief interference with the normal mesiodistal relation of the dental arches was the supraclusion of the deciduous canines. As the patient was leaving immediately for his summer vacation, it was thought in-

advisable to place appliances, yet something had to be done if possible. The deciduous canines were trimmed, not only to remove their interference but also the occlusal surfaces made slanting as guides to the normal mesiodistal relation of the arches. During vacation, the child adopted the improved occlusion as shown, greatly simplifying the treatment of the case.

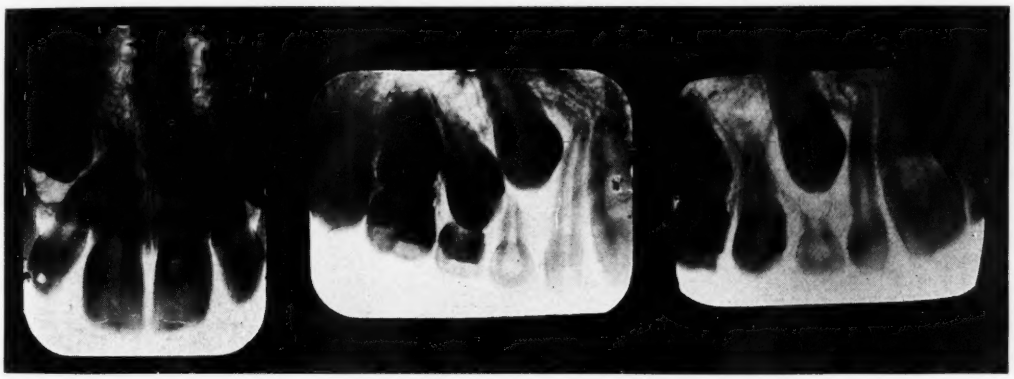
The procedure in such cases as the three just mentioned is to have the patient close the teeth as near to normal occlusion as possible and trim the interference if it appears that the necessary amount of trimming would not

Case 3.

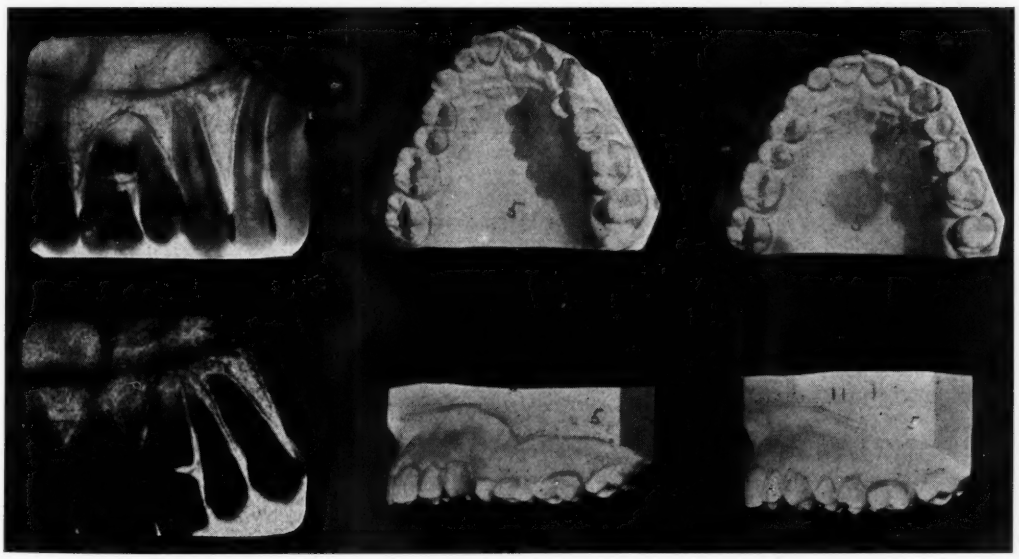
be excessive. The trimming is done partly on the maxillary and partly on the mandibular teeth, and the surfaces left are either flat or sloping in the direction which should favor normal occlusion. It is not the intention to suggest that such trimming be generally adopted instead of mechanical correction, but on the other hand these are not isolated cases, and the writer has had enough of them to feel that a knowledge of such possibilities is valuable and may occasionally be put to good use.

The second division of our subject, reducing the mesiodistal diameter of second deciduous molars, is of greater importance than the foregoing, not

because it is of greater benefit to the individual, but because there are more cases where it may be used. It is generally conceded that the combined mesiodistal diameter of deciduous canines and molars equals the combined diameters of their successors, but when the permanent canines or first premolar erupts while the second deciduous molar remains, a problem is presented. Either the dental arch must be temporarily too large, if expanded to accommodate all of the teeth with full size, or the second deciduous molar must be ex-



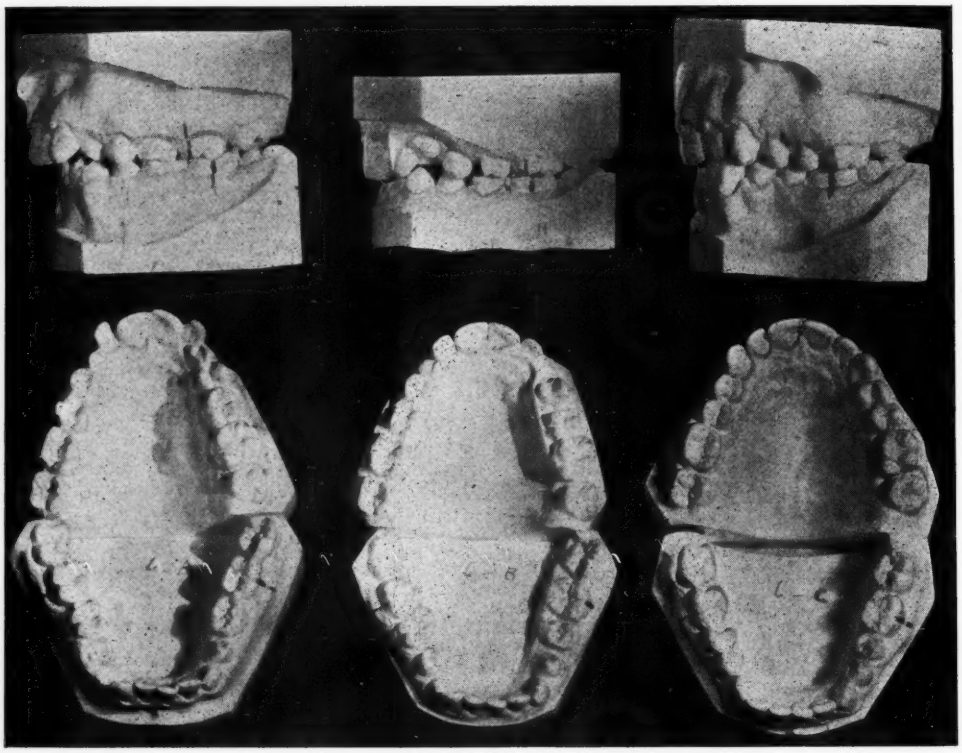
Case 4.



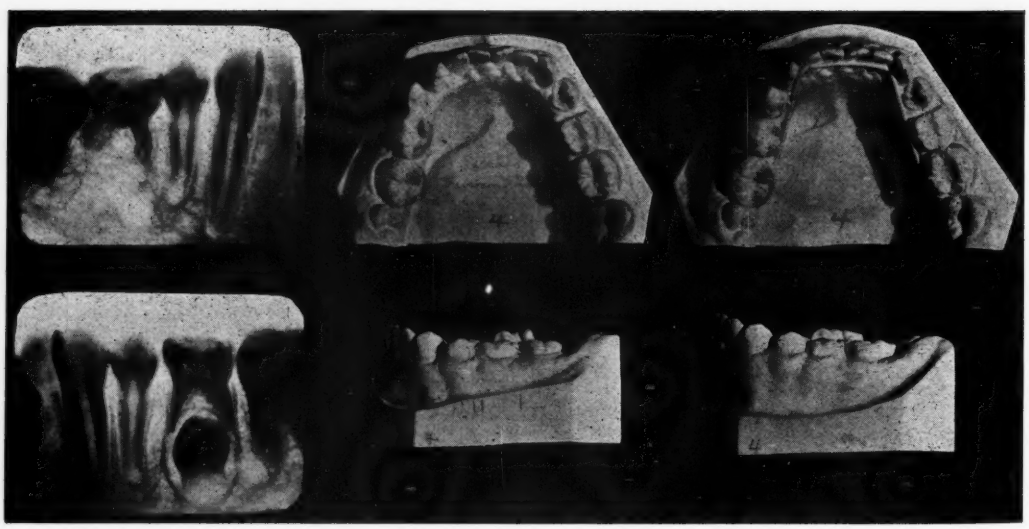
Case 5.

tracted or reduced in size mesiodistally. If the succeeding premolar is sufficiently developed and ready to erupt, the deciduous tooth may be extracted; otherwise trimming off the mesiodistal contour is advisable. This gives the necessary room, and the remaining portion of the tooth will obviate necessity for a mechanical space retainer, and, depending upon which side it is trimmed, control to some extent the drifting of the adjoining teeth. There will also be greater masticating efficiency than if the tooth were extracted, leaving as it often does only the first permanent molar for that function.

In Case 4 the x-ray shows a common condition of the crowding mesially of the permanent maxillary canine. It shows that the permanent canine is being deflected by the first premolar and not by the root of the deciduous



Case 6.



Case 7.

canine as is commonly supposed. Extraction of the first deciduous molar and trimming off the mesial contour of the second one allowed the first premolar and permanent canine to erupt into normal occlusion, the permanent canine

in its eruption caused resorption of the root of the deciduous one, proving that the root was not the cause of the deflection.

In Case 5, extraction certainly was not indicated, as the succeeding premolar was not sufficiently developed even at fourteen years of age. Trimming off the mesial contour of the second deciduous molar provided the space necessary for the correction of the teeth already erupted, leaving the remainder of the tooth as a functional unit while its successor completed its development and eruption.

In Case 6, retention of the second deciduous molars and reduction of their mesiodistal contours facilitated the correction of the mesiodistal relation of the dental arches. Extraction of these teeth would have caused a closer locking, in abnormal occlusion, of the permanent molars, possibly making intermaxillary force necessary. Trimming off the distal contours of the mandibular second deciduous molars allowed the permanent molars to drift mesially, while the deciduous molars were relieving them of some occlusal stress. Trimming off the mesial contours of the maxillary second deciduous molars allowed the maxillary first premolars to be moved distally to provide room for the canines.

Case 7 shows the application of this trimming procedure when one mandibular second premolar failed to develop and the other one was delayed in development and eruption. The mesial contour was trimmed from both deciduous mandibular second molars so that they should not occupy an excessive amount of space in the dental arch, and a gold inlay was made to protect and save as long as possible the one with no permanent successor.

In removing the contour from these deciduous molars they are not trimmed from the approximal surface but from the occlusal, making a narrow vertical cut with a flat thin-edged stone. This keeps a layer of the section being removed as a protection to the adjoining tooth until the cut is finished. The stone is run into the gum in completing the cut, which may seem severe but in reality seldom causes complaint. Occasionally the cut surface of the tooth is sensitive in which case the application of phenol or silver nitrate is usually effective.

This procedure may seem formidable to some, but it is surprising how easily it may be done on a child whose confidence has been gained. Of course the cutting should not be forced and plenty of water used to avoid overheating. For psychologic reasons the word trimming is used instead of grinding. In looking over some old models recently, for another purpose the writer came across one showing a case in which approximal trimming was done successfully twenty-two years ago, and since that time both occlusal and approximal trimming have assumed an established place in his practice.

TWO CASES ILLUSTRATING THE CLOSING UP OF LOST INCISOR SPACES INSTEAD OF MAINTAINING THEM WITH ARTIFICIAL RESTORATIONS*

By Harry E. Kelsey, D.D.S., F.A.C.D., Baltimore, Md.

CASE 1.—Patient, twelve years old, had lost left maxillary central as the result of an accident.

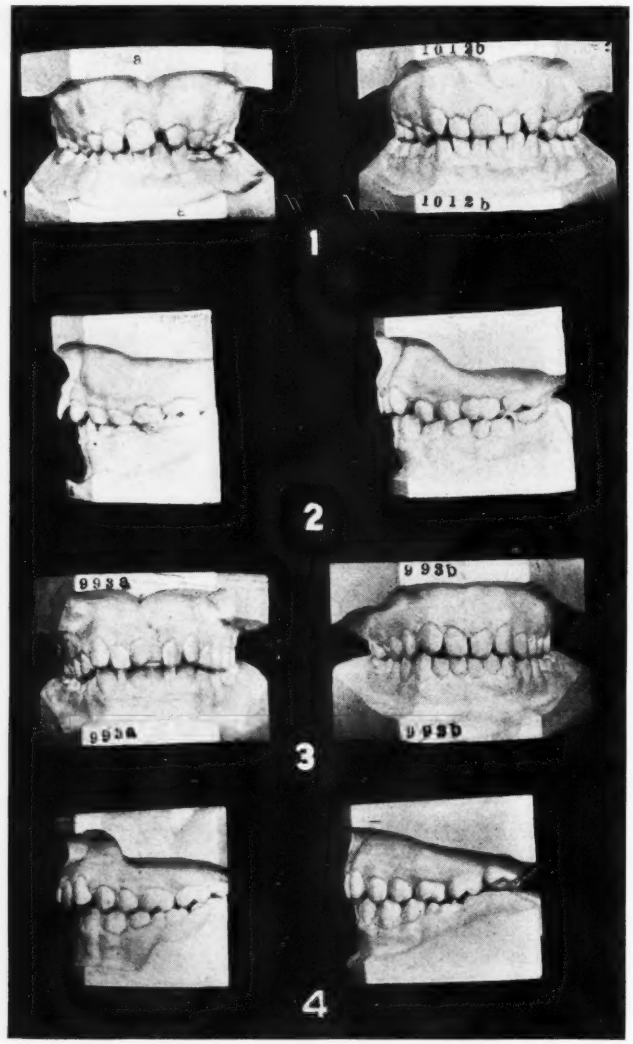


Fig 1. shows front view of case before and after treatment. It will be noted that the remaining central has tipped toward the space, thus partially closing it, but leaving another space between it and the right lateral. It was also considerably rotated as can be seen.

*Read before the Southern Society of Orthodontists, Macon, Ga., Jan. 31, Feb. 1-2, 1929.

To close this space it was necessary to permit a tendency toward distal occlusion to become complete on the left side, as is shown in Fig. 2, but I do not think this is nearly as serious as condemning the patient to wearing an artificial restoration for life. Both he and his parents are very much pleased with the result, and not one layman in a thousand notices or even knows how many incisors we should have.

CASE 2.—Patient eighteen and one-half years of age.

Fig. 3 shows a typical Class II Division 1, malocclusion, in which like the previous case, the left maxillary central had been lost by accident. In this case, however, the space was entirely closed, owing to the protrusion of the anterior teeth and the fact that the patient had resumed normal breathing and kept the lips closed. The remaining central was, however, nonvital and infected, and was also marred by a hypoplasia of the enamel. It being apparent that he would lose this tooth eventually, it was decided to remove it and close up the space, permitting the two lateral incisors to take the place of the centrals.

A slight spacing will be noted between the laterals, but this is not disfiguring. The age of this patient would have made the reduction of the mesiodistal malocclusion problematic even if the two incisors were intact.

Fig. 4 shows left side view before and after treatment.

This case was treated previous to my use of gnathostatic measurements, but I was convinced that the mesiodistal malrelation lay almost, if not entirely, in the forward displacement of the upper arch. I regret that I have not a slide of the gnathostatic model which I intend to make, to see whether it will verify my opinion regarding the mesiodistal relations.

I would like to add that I have another Class II, Division 1, case, in which both maxillary centrals were lost by accident, and in which I am also closing the space. Owing to the fact that the centrals were very large and the laterals quite small, I believe they will never completely fill the space, but they will serve as splendid vital supports for porcelain jacket crowns.

FURTHER INVESTIGATIONS CONCERNING MUSCLES AND THEIR RELATION TO THE GROWTH OF THE JAWS*

By Sheldon Friel, B.A., M.D.Sc., Dublin

I MUST apologize for the incompleteness of this investigation, but it has proved to be a far greater time consumer than was originally estimated.

During the last six years I have been examining small schools of boys annually, testing their muscle strengths, weights and heights and in the last year taking certain head measurements as well as models. These models of

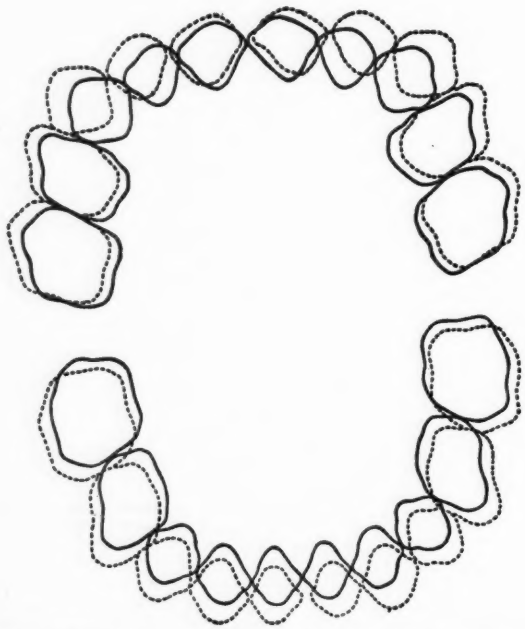


Diagram 1.—Showing the changes in the deciduous teeth from three to six years of age. Note that as well as the lateral expansion both upper and lower arches have moved forward, especially the lower arch.

the same children at different age periods and of children of the same age period had been the foundation of my paper at the International Orthodontic Congress in New York on "The Changes in Occlusion from Infancy to Old Age." I demonstrated in that paper that the mandibular deciduous teeth moved forward a greater distance than the maxillary deciduous teeth in the period from three to six years of age. This conclusion was confirmed by Professor Brash in his paper on "The Growth of the Alveolar Bone and Its Relation to the Movements of the Teeth, Including Eruption." This forward movement necessitated an edge to edge bite of the deciduous incisors and was associated with considerable wear. The curve of von Spee became flatter. Diagrams 1, 2, 3, 4. Where the forward movement had not taken place, I

*Transactions of the British Society for the Study of Orthodontics.

noticed frequently that the teeth were not worn and that an excessive overbite of the permanent incisors was present (Fig. 1).

In order to prove whether close bite had this relation to want of forward development of the lower arch and want of function, it would be necessary to examine a large number of children. So many tests and measurements being taken in the examination of these previous school children make it impossible to get through a large number of children. On this account Mr. McKeag of Belfast and I decided if possible to get hold of a large school and to limit the examination to height, weight, jaw pressure, certain head measurements and models, to see if we could determine what were the immediate causes of close bite and second, whether jaw pressure was related to it.

Last May we measured some twenty-four skulls in the R.C.S.Eng. Museum and in the Anatomical Department of Birmingham University to see if they would give any indications as to the nature of normal bite.

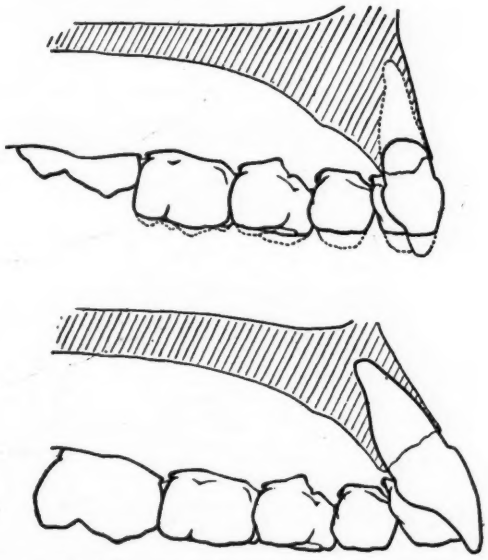


Diagram 2.—Showing the different inclination of the deciduous and permanent incisors. The incisal edges of the maxillary permanent incisors occupy a larger arch of a circle than that of their predecessors.

Early in the summer I got in touch with an industrial school outside Dublin, containing 760 boys from seven to sixteen years of age. Mr. McKeag and I gave up the last four days of our holidays to examine them. The first day we went through the whole 760 boys and selected those with functional normal occlusion and those with close bite. We selected altogether 270 boys. The next three days we attempted to test and measure these boys. We only succeeded in examining 162, and we shall not be able to conclude the examination until some time later.

The time since the examination at the end of August till now was far too short to work out the material satisfactorily. The making of 162 pairs of models alone is quite an undertaking. For these reasons this report must be taken as being of a preliminary nature, and the conclusions drawn are put forward very tentatively.

The measurements and pressures are grouped in relation to the boys' sitting height. Each group comprises boys varying 2 cm. in height. It is hoped in the final paper to group them also according to their dentitions, as has been done by Hellman in his paper "A Preliminary Study in Development as It Affects the Human Face."

The head measurements carried out by Mr. McKeag were from the nasion to the submental point, nasion to the incisal edge of the maxillary incisors, nasion to the occlusal surface of the maxillary first permanent molar,

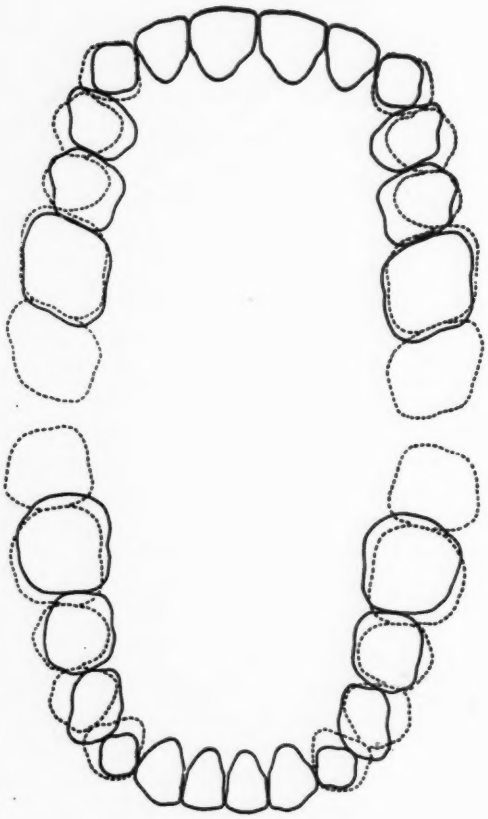


Diagram 3.

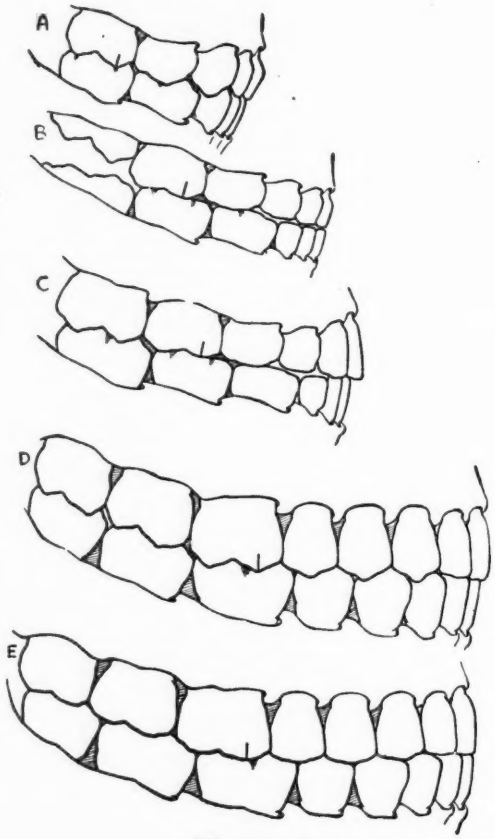


Diagram 4.

Diagram 3.—Showing changes following the loss of the deciduous molars and canines. Note that spaces are completely closed in the lower arch, but spacing is present in the region of the canine in the upper arch.

Diagram 4.—Stages of occlusion from three years of age to old age. *A*, At three years of age the triangular ridge of the mediobuccal cusp of maxillary second deciduous molar occludes in the buccal groove of the mandibular second deciduous molar. *B*, At five and a half years of age lower arch has moved forward, so that the buccal groove of the mandibular second deciduous molar is medial to the triangular ridge of the maxillary second deciduous molar. *C*, At eight years of age the mandibular arch has moved slightly more forward in relation to the upper arch; the permanent incisors and first permanent molars have erupted. *D*, Young adult. The point of the cusp of the maxillary first permanent molar is medial to the buccal groove of the mandibular first permanent molar. No contact between the distobuccal cusp of maxillary first molar and mediobuccal cusp of mandibular second molar. *E*. Old age. Teeth worn. Mandibular teeth in more forward relation to maxillary teeth. Buccal groove of mandibular first permanent molar is medial to mediobuccal cusp point of maxillary first permanent molar. Distobuccal cusp of maxillary first permanent molar is in contact with mediobuccal cusp of mandibular second molar. Incisors meet edge to edge.

the incisal edges of the mandibular incisors to the submental point, and the occlusal surface of the mandibular first permanent molar to the lower border of the mandible in cm.

It was not thought advisable to take measurements from the nasion to the maxillary incisal gum margin or from the mandibular incisal gum margin to the submental point, partly on account of gingivitis and gum hypertrophy, and partly because it would be impossible to take similar measurements in the molar region. The instruments used were those designed by Mr. G. G. Campion.

The jaw pressure was taken between the first permanent molars right and left sides and between the central incisors, in kilograms. The weight was also taken in kilograms and the sitting height in centimeters. Composition impressions were taken.

In addition to the 162 boys examined at this school, 91 boys from previous examinations that had the necessary head measurements were included, making a total of 253 cases; 144 of these had functional normal occlusion with an overbite of the maxillary incisors over the mandibular incisors less than half of the labial surface of the mandibular incisors. The remaining 109 had an overbite a half or greater than the labial surface of the mandibular incisors.

The statistics of each sitting height group of normal and of excessive overbite cases were separately added and the averages of each found. The percentage of normal of the average in each group of the excessive cases was calculated and then the average percentage of normal for all groups for each measurement found.

By this method a fair indication could be given as to the part played by any group of measurements in the excessive overbite cases compared to the normal.

TABLE I

AVERAGES OF SKULL MEASUREMENTS WITH PERCENTAGES OF NORMAL
(BOYS)

	NASION SUB-MENTAL	NASION INCISOR	NASION MOLAR	MANDIBULAR INCISOR SUBMENTAL	MANDIBULAR MOLAR—LOWER BORDER MANDIBLE	NO. OF CASES
Saxon skulls (adults) Birmingham	11.5 cm.	7.7 cm.	6.1 cm.	4.0 cm.	3.9 cm.	12
British skulls (adults) R.C.S.Eng.	10.4 cm.	6.9 cm.	5.2 cm.	3.8 cm.	3.4 cm.	7
British skulls (children) R.C.S.Eng.	9.6 cm.	6.6 cm.	4.8 cm.	2.8 cm.	3.2 cm.	3
Mr. Campion's averages at 9-11	10.0 cm.	6.4 cm.		3.6 cm.		10
Mr. Campion's averages at 15-16	11.1 cm.	7.3 cm.		4.1 cm.		9
Mr. Campion's averages at adult	12.3 cm.	7.7 cm.		4.5 cm.		10
Industrial school boys (norms.)	10.5 cm.	6.9 cm.	5.6 cm.	2.9 cm.	2.3 cm.	144
Saxon skulls, percentage of boys (norms.)	109%	109%	108%	128%	141%	
British skulls (adults), R.C.S. Eng., percentage of boys (norms.)	99%	100%	92%	124%	132%	
British skulls (children), R.C.S. Eng., percentage of boys (norms.)	91%	95%	83%	96%	128%	

TABLE II

AVERAGES OF 144 NORMAL AND 109 EXCESSIVE OVERBITE CASES, WITH PERCENTAGES OF NORMAL IN OVERBITE CASES

SITTING HEIGHT	WEIGHT	RIGHT MOLAR	LEFT MOLAR	INCISOR	NASION SUBMENTAL	NASION INCISOR	NASION MOLAR	MANDIBULAR INCISORS SUBMENTAL	MANDIBULAR MOLAR—LOWER BORDER MANDIBLE	NO. OF CASES TYPE
cm.	kg.	kg.	kg.	kg.	cm.	cm.	cm.	cm.	cm.	
61-63	28.7	25.6	24.6	9.5	9.58	6.34	4.58	3.05	2.5	3 Normal
64-65	26.64	32.2	31.2	12.0	9.76	6.47	4.93	2.72	2.13	11 Normal
	24.8	20.6	22.5	6.0	9.76	6.52	4.74	3.39	1.96	4 Excessive
	93.5%	64.0%	72.1%	50.0%	100.0%	100.7%	96.1%	87.0%	92.0%	
66-67	29.9	36.13	36.7	12.2	9.97	6.55	5.03	3.07	2.44	12 Normal
	30.15	30.7	31.2	11.9	10.09	6.83	5.18	2.69	1.94	11 Excessive
	100.8%	84.0%	85.0%	97.0%	101.2%	104.0%	103.0%	87.0%	79.5%	
68-69	31.5	33.3	33.05	11.09	10.13	6.71	5.18	2.77	2.20	22 Normal
	30.9	33.1	34.6	10.5	10.05	6.71	5.20	2.57	1.97	16 Excessive
	98.1%	100.0%	104.6%	94.0%	99.2%	100.0%	100.4%	92.0%	89.5%	
70-71	34.17	42.72	43.31	16.51	10.39	6.81	5.23	3.05	2.46	30 Normal
	34.12	41.7	42.54	18.5	10.27	6.89	5.21	2.75	2.14	26 Excessive
	99.8%	97.0%	98.2%	112.0%	98.8%	101.0%	99.6%	90.0%	87.0%	
72-73	37.08	39.9	41.52	14.28	10.55	7.06	5.45	2.77	2.17	21 Normal
	35.24	38.11	41.94	16.40	10.36	6.95	5.29	2.73	2.13	25 Excessive
	95.0%	95.0%	101.0%	128.0%	97.7%	98.0%	97.0%	98.0%	100.0%	
74-75	38.8	46.7	46.7	17.2	10.52	6.91	5.41	3.02	2.37	20 Normal
	38.7	40.5	38.6	14.7	10.66	7.04	5.57	3.10	2.37	15 Excessive
	100.0%	86.0%	82.6%	85.0%	101.3%	101.0%	103.0%	102.0%	100.0%	
76-77	45.37	48.57	49.57	22.05	11.04	7.36	5.85	2.89	2.10	9 Normal
	43.2	38.0	41.3	10.2	10.83	7.33	5.60	2.47	1.78	4 Excessive
	93.0%	78.0%	83.3%	46.0%	98.9	99.0%	95.7%	85.0%	84.8%	
78-79	50.33	43.6	41.3	15.3	11.37	7.31	5.83	2.73	2.17	3 Normal
	43.97	48.0	44.3	21.12	10.89	7.3	5.68	3.20	2.21	4 Excessive
	87.3%	110.0%	107.2%	138.0%	95.8%	99.0%	97.4%	117.0%	101.4%	
80-81	50.4	48.8	42.6	16.3	11.42	7.41	5.75	2.70	2.01	5 Normal
	48.9	43.0	42.0	12.3	11.35	7.65	5.95	2.71	1.97	3 Excessive
	97.0%	89.0%	98.6%	75.0%	99.3%	103.0%	96.6%	100.0%	98.0%	
82-83	52.26	48.0	48.6	15.16	11.43	7.54	5.93	2.68	2.15	3 Normal
	50.80	57.0	53.0	31.5	11.35	7.72	5.84	2.74	2.19	1 Excessive
	97.2%	118.0%	109.0%	207.0%	100.7%	102.0%	98.4%	102.0%	101.4%	
84-85	50.7	53.6	46.7	17.7	11.76	7.78	6.07	2.71	2.13	4 Normal
86-87	63.4	59.0	57.5	19.0	11.85	7.60	5.86	2.83	2.30	1 Normal
					Average percentage of normal of overbite cases					
	96.17%	92.0%	94.16%	103.0%	99.29%	100.0%	98.72%	96.0%	93.36%	

TABLE III

AVERAGES OF 7 MARKED EXCESSIVE OVERBITE CASES, WITH PERCENTAGES OF NORMAL IN OVERBITE CASES

SITTING HEIGHT	WEIGHT	RIGHT MOLAR	LEFT MOLAR	INCISOR	NASION SUBMENTAL	NASION INCISOR	NASION MOLAR	MANDIBULAR INCISORS SUBMENTAL	MANDIBULAR MOLAR—MANDIBULAR BORDER MANDIBLE	NO. OF CASES TYPE
cm.	kg.	kg.	kg.	kg.	cm.	cm.	cm.	cm.	cm.	
70-71	34.17	42.7	43.3	16.5	10.39	6.81	5.23	3.05	2.46	Normal
	34.6	39.0	39.2	19.2	10.38	7.01	5.34	2.26	1.72	4 Excessive
	101.2%	91.1%	90.5%	116.3%	99.9%	102.9%	102.1%	70.8%	70.0%	
72-73	37.08	39.9	41.5	14.2	10.55	7.06	5.45	2.77	2.17	Normal
	36.2	41.0	43.0	22.0	10.82	7.16	5.46	2.60	1.77	1 Excessive
	97.6%	102.7%	103.6%	154.9%	102.5%	101.4%	100.2%	93.8%	81.5%	
74-75	38.8	46.7	46.7	17.2	10.52	6.91	5.41	3.02	2.39	Normal
	38.5	41.0	42.0	13.0	10.65	7.15	5.32	2.70	1.92	1 Excessive
	99.2%	87.8%	90.0%	17.0%	101.2%	103.5%	98.3%	89.4%	80.3%	
76-77	45.37	48.5	49.5	22.0	11.04	7.36	5.58	2.89	2.10	Normal
	42.10	35.0	40.0	13.0	10.23	7.22	5.26	2.38	1.96	1 Excessive
					Average percentage of normal in marked overbite cases					
	97.7%	88.4%	93.2%	86.8%	98.8%	101.5%	97.6%	84.07%	81.27%	

In order to see if a small number of very marked cases of excessive overbite would show an increased difference with normal, seven models were selected where there was no mutilation, and their statistics worked out in a similar manner.

The obvious conclusions to be drawn at the first glance at the statistics are that the measurements of the skulls are comparable to a large degree proportionately to those of the normal boys except in the depth of the mandible in the incisal and molar regions. Here the jaw diminishes in depth from the Saxon skulls to the British skulls and still further to the normal boys. When one looks at the percentages of the general averages of the excessive overbite cases, this diminution in the depth of the mandible has become much more marked and even more so in the seven selected cases of marked excessive overbite (Figs. 2 and 3).

Very little difference is seen in the measurements of the normal and excessive overbite boys from nasion to submental point and nasion to the incisors. Slight decrease in the nasion to molar measurement. Considerable decrease in the molar pressure, but the incisor pressure was most inconclusive as the variations in this test were enormous, from 50 per cent to 207 per cent in the general averages, and from 17 per cent to 154 per cent in the selected cases.

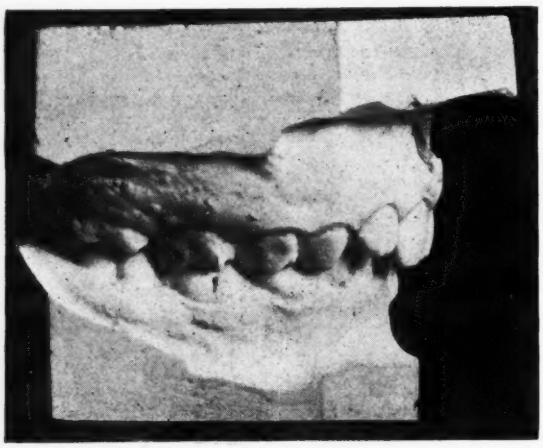


Fig. 1.

I do not think one can escape from the conclusion that function, or rather lack of function, must be responsible for the gradual reduction in the depth of the mandible from the Saxon skulls to our own modern overbite cases. There have not been sufficient cases for us to state whether this lack of muscular pressure is the same in the incisor region as in the molar region.

The percentage of decrease in the depth of the jaws in the molar region is more marked than in the incisor region, and certainly it was a revelation to me that excessive overbite was not caused by an increase in the mandibular incisal depth with very few exceptions.

The majority of cases were caused by a greater deficiency in the mandibular molar region compared to the mandibular incisal region.

In some cases it was difficult to see how the overbite had come about, the measurements compensating each other, and it was felt that it would be necessary to take horizontal as well as the vertical measurements in order to see whether lack of forward growth of the mandible was the deciding factor. This presents certain difficulties. The prosopometer measures from the external auditory meatus to the incisors. It is not a horizontal plane, and it is

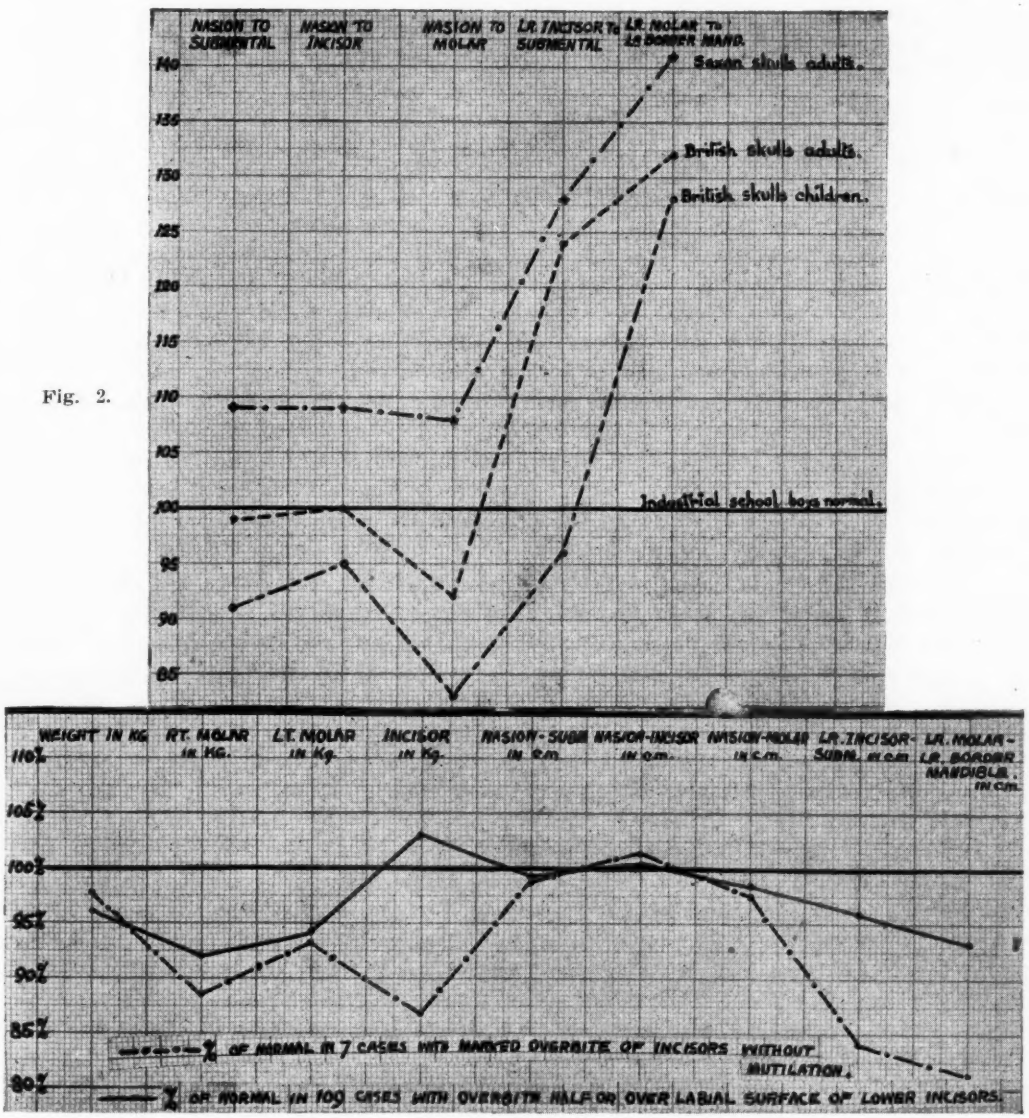

NASION TO SUBMENTAL
NASION TO INCISOR
NASION TO MOLAR
LR. INCISOR TO SUBMENTAL
LR. MOLAR TO LR. BORDER MAND.
Saxon skulls adults.
British skulls adults.
British skulls children.
Industrial school boys normal.
WEIGHT IN KG.
RT. MOLAR IN KG.
LT. MOLAR IN Kg.
INCISOR IN Kg.
NASION-SUBM IN c.m.
NASION-INCISOR IN c.m.
NASION-MOLAR IN c.m.
LR. INCISOR-SUBM. IN c.m.
LR. MOLAR-LR. BORDER MANDIBLE IN cm.
% OF NORMAL IN 7 CASES WITH MARKED OVERBITE OF INCISORS WITHOUT MUTILATION.
% OF NORMAL IN 100 CASES WITH OVERBITE HALF OR OVER LABIAL SURFACE OF LOWER INCISORS.

Fig. 2.

Fig. 3.

not nearly at right angles to the vertical measurement, but rather an oblique plane, and consequently it would be influenced by increased vertical growth. It will be necessary to devise some method of getting the measurements taken parallel to the Frankfort plane.

The addition of the averages of the measurements from the nasion to the maxillary incisors and the mandibular incisors to submental point should be somewhat more than the averages from the nasion to the submental point in

overbite cases, but in the measurements of the boys the addition was less. It is curious how this has come about as almost all the boys had an overbite of the maxillary incisors over the mandibular. Apparently the nasion to the submental point is the measurement at fault. It is the most difficult measurement to obtain accurately.

Mr. McKeag and I both feel that this incomplete investigation has thrown quite a new light on the problem of excessive overbite, and that it may be well worth while to continue the investigation much further, and if possible to extend it to children from four to seven years of age.

DISCUSSION

Mr. Northcroft said he had been very much interested in hearing the results of Mr. Sheldon Friel's painstaking investigation. The one point which had struck him had been whether Mr. Friel was not overstressing the power of function in its effect on development. The members would recollect that Lundström, in his original monograph, had belittled the overstressing of function which had been going on in the profession previous to his paper; and personally he could not help thinking that in the case of the Bideford-on-Avon Anglo-Saxon skulls the development of those jaws had not been entirely due to the functional use of the jaws as jaws, but probably due to the whole development of the skeleton of the individual. If one took the jaws as functioning entities, one probably got the jaws functioning at their greatest activity with the Eskimo, and one certainly did not get anything like the growth of jaw bone in the Eskimo which one did in those Anglo-Saxons; and he could not imagine that the Anglo-Saxons chewed any harder than the Eskimos. If he understood Mr. Friel rightly, he drew the conclusion that the Anglo-Saxon jaws were so developed because of their excessive function.

Mr. A. T. Pitts said he would like to raise a point about the changing occlusion to which Mr. Friel had drawn attention. Mr. Friel stated that in young children of about 3 there was a normal degree of overbite. He also suggested that the occlusion altered at about the age of 5 to 6 and became an edge-to-edge bite so far as the incisors were concerned. A good many years ago Mr. Warwick James had made the same statement. Personally, he had been interested in that point for some years, although he had not taken any actual measurements. During the last six or seven years he had been observing a considerable number of children, and he had rather come to doubt whether that statement was correct. At first sight it certainly looked as though it was, because in any number of children about the age of 5 one noticed that in a large percentage of them there was the spacing which should occur. One found also that the overlapping of the maxillary incisor teeth had been worn away, and that there was a very definite wearing down of the deciduous canines. When those children were told to bite, their jaws closed and the incisors met edge to edge; but with a little perseverance one found that those children could bite back. It was a little difficult to define exactly what occlusion was, but it roughly meant that the condyle was in its most posterior condition, and that such a thing as a bite of convenience was excluded. It seemed, therefore, so far as his own observations went, that the wearing down of the incisors was due to the fact that the range of movements in young children was chiefly in a forward direction, with only a slight degree of lateral play. Although the movement of the incisor teeth in spacing produced an altered occlusal plane, yet the relationship of the maxilla and mandible remained approximately constant. He knew that others had shown undoubtedly there was a forward movement of all the teeth going on, but it had not appeared to him that the forward movement of the mandibular teeth occurred to a greater extent than the maxillary teeth, thus bringing the occlusion from the overbite position of the incisors to the edge-to-edge bite. In a certain number it was true that, so far as one could find, the bite was definitely edge-to-edge. Unless one had been able to watch the children over a period of two or three years it was difficult to be certain that they had not always had an edge-to-edge bite, because one sometimes did see such an occlusion in a child of 3 years of age, though he admitted it was rare. He raised the point

because it was one of very great interest, and his own observations did not wholly coincide with those of Mr. Friel.

Mr. Friel said he thought the best answer he could give to convince Mr. Pitts was to show him models of children 7 years of age; Mr. Pitts would see that the mandibular deciduous molars were more medial in their relation to the maxillary teeth than is the case in a 3-year-old child. The same forward relation of the molars is present just previous to the loss of the deciduous incisors.

Mr. H. Chapman remarked that one saw it frequently stated in the journals that close bite was associated with very short crowns of the molars, and perhaps short roots of the molars. He would like to know whether in his investigations Mr. Friel had noticed that to be a fact, or whether it was that the error was entirely in the depth of the basal portion of the mandible and not at all in the teeth themselves.

The Society was very much indebted to Mr. Friel for bringing such an important work before it.

Mr. Norman G. Bennett asked Mr. Friel whether his close bite cases were in normal occlusion or postnormal, or mixed. There was a great difference between the two. The close bite in postnormal occlusion was a consequence of the postnormal occlusion. True close bite was what one got with a normal occlusion in which, without being posterior to their normal position, the mandibular incisors impinged very firmly against the maxillary incisors, and one got proclination as a consequence.

Mr. Sheldon Friel, in reply, said that Mr. Northcroft doubted whether function was the cause of the lack of development of the mandible, and that the development in the Saxon skulls was not a true example of the result of function, and that he (Mr. Friel) should have examined Eskimos. Granting that the dynamometers were a test of function, the children who had close bite, and who were definitely limited in their function, undoubtedly had a lower dynamometer pressure than children with a normal bite. It was quite appreciable in one of the graphs he had exhibited, and they were really uniform in the molar region. In the incisor region it jumped about and was most inconclusive. Mr. Northcroft said that the Eskimos had not a massive type of jaw like the Saxon skulls. Mr. Friel did not like to differ from Mr. Northcroft, but he thought they had a deeper jaw, and he would measure one later to see. Mr. Chapman had asked whether the lack of development in the molar region was due to the crowns of the molars not being uncovered—not apparently out of the gum enough, or whether it was that the distance from the alveolus to the lower border of the mandible was too short. Personally, he thought it was the latter—that the alveolus and body of the mandible had not developed. Mr. Bennett had drawn a distinction between inferior postnormal arch relationship, overbite cases and normal arch relationship overbite cases. The subjects were all excessive overbites, but the seven selected cases were definite excessive overbites which were not necessarily associated with postnormal arch relationship; it was very difficult to have an overbite without a postnormal relationship of some degree. Although the postnormality might produce a close bite, it could also be produced by some buckling or want of growth of the arch. One could not separate them into two definite classes. If the case had normal arch relationship, one either had spacing of the maxillary incisors or crowding of the mandibular incisors.

THE RESPONSIBILITY OF THE OPERATOR FOR RELAPSES AFTER ORTHODONTIC TREATMENT EXECUTED IN FULL ACCORD WITH THE DIRECTIONS OF LEADING AUTHORITIES*

By Axel F. Lundström, Stockholm, Sweden

MOST orthodontists who have been engaged in active practice for any considerable number of years, and who have been in the habit of studying the final results of their treatments, must have arrived at the disheartening conclusion that in many cases these results are very different from what they expected. On the other hand, we have a very simple theory as a basis for our treatments. In our periodicals a large amount of space has been allotted to case reports, in which the descriptive accounts are limited to a discussion of a suitable tooth-moving appliance and an exhibition of the immediate result. This shows that in the minds of at least a considerable number of practitioners the art of correction of malocclusion consists of mechanical problems.

There are also writers who claim that the final conditions of treated cases are proofs that the manipulations to which the cases have been subjected correspond with what the individual case demanded. Some of these statements will be discussed later, but I will at present only make the remark that their assertions have a tendency to retain orthodontics in the combination of mechanical art and natural philosophy, in which this art still remains, even if it must be admitted that promising signs of a new tendency are by no means wanting.

The chief difficulty appears to me to be this that the practical treatment and the mechanical technic have, so to say, bolted off, while the scientific foundation, the knowledge of the real effects of mechanical or other kinds of treatment, is very limited. And as long as this condition remains we must expect that our manipulations will to some extent fail to secure the results we have aimed at. Also, there are certain risks that trying treatments will be performed with the object of obtaining a final result, which may have ensued without any artificial disturbance whatever.

Both these possibilities being extremely undesirable, it ought to be an important task to investigate the possibility of anticipating the real effect of the treatment.

Having examined a number of my cases many years after the removal of the retainers, I have collected some material from which it seems to me to be possible to draw some conclusions as to which malocclusions may and which may not be successfully treated. A very important question in this connection and deserving to be fully discussed is this: to what extent is the operator responsible for the nonattainment of results after a treatment executed in

*Transactions of British Society for the Study of Orthodontics.

full accord with the assertions published in official textbooks or in such as have been more universally adopted as being reliable?

At the present time there are probably very few orthodontists with any considerable experience who do not at times resort to extraction of teeth. But on the other hand we find many indications that the announcement of Angle concerning the normally occluding denture as an attainable objective still has a very powerful influence. We find several very definite declarations in this direction in the proceedings of the First International Orthodontic Congress, and those who examined the models exhibited at that Congress will no doubt have a vivid recollection of the way in which the theory in question still governs orthodontic therapy.

But anyone who gives time to study our literature carefully will find certain suggestions as to treatment, indicating a presentiment of an unavoidable retreat. These modifications in the original methods imply a tacit admission that permanent results are not always to be expected after the attainment of normal occlusion. At least five of this kind have been given; they are:

(1) The necessity of bodily moving appliances.
(2) So-called physiologic tooth movement.
(3) Early treatment.
(4) Extraction of second or third molars.
(5) Muscle exercises.

Before setting down a rule for therapeutic activity we ought first to present evidence of its being reliable. It appears to me that those authors who have given the above-mentioned directions have not produced sufficient clinical data of a character to prove the validity of their claims.

(1) *Bodily Moving Appliances.*—Having in a former paper given a rather detailed account regarding the clinical evidence as to the permanence of the results obtained after the use of bodily moving appliances, it is unnecessary to occupy ourselves much more with this question at present. I have not been able to find any new data which confirm this method's supposed capability to effect a permanent change of the size and form of the regions beyond the apical plane. On the other hand, an observant student of current literature will find passages indicating the inefficiency of the method as regards these facts.

For instance, in the year 1924 Hawley[1] published thirty cases treated with the ribbon arch, and, as may be seen from the illustrations, the temporary result was very gratifying. But shortly after we find Hawley an enthusiastic admirer of the Simon method of diagnostics. It appears to me that this would hardly have happened unless some of the published cases had relapsed. And another practitioner with an extensive experience in the operating of bodily moving appliances, Young,[2] positively states that the basal portion of the jaws cannot be changed by tooth-moving appliances.

(2) *Physiologic Orthodontics.*—Several authors have stated that we have at our disposal a method, working more slowly, without interruption, and with a minimum of functional disturbance. As distinct from other methods, this one should be called physiologic. Mershon has developed this method to a high degree of perfection, and he is of the opinion that he has succeeded in

getting more permanent results than was possible with the older appliances.[3] A very extensive collection of closely controlled clinical data is necessary to prove this assertion but has not yet been published.

(3) *Early Treatment.*—Any operator with an extensive experience in the orthodontic treatment of children of different ages will certainly admit that the very early treatment is more exacting to the operator than, for instance, the eleventh or twelfth year. One reason, and probably the chief one, to choose the more exacting period is that the relapse of cases has been attributed to the fact that treatment had been postponed to a comparatively unfavorable age. The cases (Figs. 1-2 and 3-4) are instances of rather rapid treatment in somewhat complicated cases, the time of active treatment, including the time taken for placing the appliances in position, being respectively seven and eight months. No special technical reasons for an earlier treatment seem to me apparent in these cases.

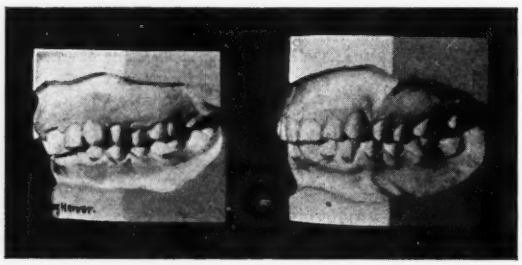


Fig. 1. Fig. 2.

Fig. 3. Fig. 4.

The earlier age has been chosen on the assumption that the facility of "stimulating" growth is in an inverse proportion to the age of the patient. The earlier the treatment is started the greater is the effect supposed to be. This assumption is probably correct as regards treatment for growth disturbances of an endocrine character. But if we except the acromegalous deformity we have as yet not succeeded to procure evidence that malocclusions of the teeth are endocrine disturbances, and, moreover, our methods of treatment are purely mechanical and functional.

Some authors have given orthodontics the name dental or dento-facial orthopedia. This term is suggestive of a similarity between our specialty and orthopedic surgery and mechanotherapy. But in reality there are considerable differences between both these arts. The art of orthopedic surgery has for its essential objective the treatment of the results of tuberculous and other

pathologic changes in the tissues. The objective of orthodontics has been to change the mass of bone and shift its position, but as far as we can see the bone itself has not undergone any pathologic change. It is only in cases of distoclusion and possibly also in a limited percentage of mesioclusions that there seems to be some affinity with orthopedics proper, as perhaps these anomalies are connected with an abnormal functioning of the mandibular joint. I will later discuss the evidence that has been published to prove the advantage of early treatment.

(4) *Extraction of Second or Third Molars.*—Barnes[4] is one of the very few orthodontists who have taken the trouble to examine and publish the final results of their treatments. His examinations have clearly demonstrated the risks of relapses in cases of crowded dentures. It is his opinion that a very frequent cause of this is the pressure of the erupting third molars, the pressure being transmitted from the second to the first molars, premolars and anterior teeth. Therefore he recommends the removal of the second or third molar.

This hypothesis seems to me very improbable. If really the third molar should exert any considerable force, we should expect that the teeth anterior to this tooth, being locked in occlusion, ought to be able to present a very

Fig. 5. Fig. 6. Fig. 7.

effective resistance, and that as a result of this the bony tissue posterior to the third molars would be resorbed. The investigations concerning the growth of the mandible have made clear that the forward growth is effected by means of a resorption of bone at the anterior border of the ramus and the region immediately posterior to and in the same level as the crown of the third molar. Aichel,[5] who has given much attention to this problem, is of the opinion that no evidence whatever has been presented to prove that the teeth travel horizontally in an anterior direction. He reminds us of the fact that the septa alveolaria consist of strongly built bone, while the alveolar walls of the developing tooth bulbs are exceedingly thin and porous. It seems to him difficult to assume that these thin shells of bone should present a resistance strong enough to cause the resorption to occur in the septa alveolaria. The case (Figs. 5, 6, 7) shows a relapse in the anterior region of the arch reminding somewhat of some of Barnes's cases, although in this case a premolar had been extracted. The explanation is in my opinion simply this: the anterior section of the mandibular base has been too small even for the reduced number of teeth.

(5) *Muscle Exercises.*—Another theory that has been advanced to explain the relapse of cases is that the functioning of certain groups of muscles has been subnormal. As a suitable supplemental treatment it has been suggested to

stimulate artificially those muscles whose subnormal tonicity is supposed to have been an active factor in the production of the malocclusion.

I would not like to be understood as denying the value of muscle exercises in the treatment of certain varieties of malocclusion. It seems to me highly probable that Rogers[6] could have effected the result shown in Figs. 8 and 9 without the use of any appliances, only through the medium of his muscle exercises. But when he declares that with the help of muscle exercises it is possible to effect an increase in the width of the maxillary base itself, it is hard for me to follow him. The material he has hitherto published seems to me insufficient. Moreover, many observations have been made which are incompatible with this functional hypothesis. Space does not allow me to go into details, but I will mention just a few: for example, the apparently normal size of the maxillary and mandibular bases in cases of congenital absence of teeth and in cases of ankylosis, and the common occurrence of a crowding of the teeth in one jaw and a normal size of the base in the other in the same individual. And if we find instances of a subnormal size of the bases in cases in which we are able to conclude that the function has been active, it seems to me hard to understand how an artificially stimulated function will be able to effect what the natural function evidently would not attain.

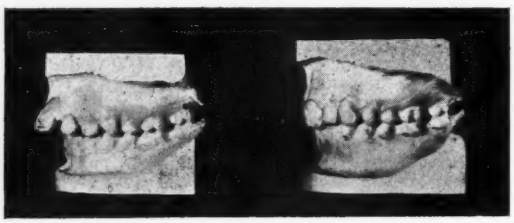


Fig. 8. Fig. 9.

We have, as far as I can see, not yet collected a sufficient number of clinical data to be able to prove that bodily moving appliances, so-called physiologic orthodontics, early treatment or muscle exercises are capable of effecting such a change in the regions beyond the apical planes that an artificially attained normal occlusion will become permanent in every case. However, it seems to me to be not at all improbable that if a practitioner follows the rule of treating every malocclusion he detects at an early stage and with normal occlusion as his objective, then the average final results will seem to justify these principles of treatment. But even if it seems so, we ought not to be content with this. We ought to try to find out the clearly demonstrable results of orthodontic manipulations, so that we do not perchance treat cases which would have developed into normal conditions without any interference whatever.

Growth Sites and Experimentally Demonstrated Effects of Orthodontic Tooth Movement.—The increase in bone tissue, which characterizes the growth of the jaws, takes place according to Brash[7] partly in the sutures, partly on certain surfaces through periosteal apposition, and partly immediately underneath the roots of the teeth. The investigations of Sandstedt, Oppenheim and Leroy Johnson[8] demonstrated certain changes in the immediate surroundings

of the teeth. There is no evidence of any growth in the jaw bones analogous to what Brash has shown to occur in periosteal and suture growth. Dewey has been able to produce sutural growth in the sutura palatina mediana in a dog after rapid opening of the suture by means of an orthodontic appliance. But a successful opening of the suture in the molar region in man must also imply the overcoming of an apparently very strong resistance in the region close to the malo-maxillary suture. It must be a very uncertain undertaking to use orthodontic force on the teeth alone and through any such method attempt to effect the harmonious interaction of apposition and resorption, which occurs in the normal growth of the jaws.

It appears to me to be very improbable that an harmonious growth of this character could be attained by means of an increased masticating function. Among other reasons, which have been published elsewhere, I would suggest the following: if it is a certain amount of function that effects that growth of the jaws, which renders the final eruption of the teeth into normal occlusion possible, then it seems to me that a supernormal but in other respects similar function ought to effect an abnormal increase in the ordinary growth sites of the jaws, and we would in such cases expect to find among other peculiarities abnormal spaces between the incisors and an abnormal vertical development of the face. Those changes which have been observed in cases of excessive masticating function, as, for example, in the Eskimos, are of a very different character.

Let us now assume that the professional men who first became interested in malocclusions were taking into consideration whether it might be possible to correct these disorders; that, suspecting that the disorders in question might be results of growth disturbances, and being convinced that before treating a disorder you must first know something about it, they began to study the growth of the jaws instead of just inventing and placing in position certain machinery for moving the teeth. If we assume that they had advanced so far in these studies that Brash's results had been reached, we can hardly imagine that they would think it possible by means of the orthodontic methods at our disposal to attain what is in our own time the most common objective of our treatment in cases of jaw deformities.

A careful study of the final results of the orthodontic treatment of cases will disclose a vast difference between what is stated as occurring and what in reality does occur. This fact is most clearly revealed in our literature as a result of the incomplete character of the clinical data. Final results of quite a number of types of malocclusion have not yet been published.

In this connection I will relate a rather peculiar experience I had during my last visit to the United States. I had read a paper in which I had described some cases of jaw deformities exhibiting rather remarkable growth conditions. During the discussion following the paper a gentleman complimented me on what he was pleased to call my courage to exhibit my failures. That this can be said and applauded at a scientific meeting shows how far we still are from having obtained the true scientific view on the object of our studies.

If to a certain extent our results are not in accord with our hypothesis, it is evidently of great importance to be able to determine the characteristics of

the malocclusions with an unfavorable prognosis. In the following an attempt will be made to give an account of the peculiarities of certain types of malocclusions, using as a basis some cases from actual practice. As the scope of this subject is rather extensive, it will be advisable to restrict somewhat the problem to be discussed. I have, therefore, purposely omitted several types of malocclusion, among them the greater number of those which seem to be the results of habits.

The types of malocclusion may conveniently be divided into two classes: (1) malocclusions in which the size of the region beyond the apical plane is in harmony with the coronal curve when the full complement of the teeth is in normal approximal contact; (2) those in which this harmony does not exist.

In cases belonging to the former group the basal region is normal. There are several different varieties and their characteristics are best described by help of cases from practice.

The basal region was apparently normal in the case shown in Fig. 10 and the malocclusion restricted to the left side. As it was necessary to move the molars backward in both jaws, the application of force and the economizing with the anchorage were rather difficult; and we find a small amount of over-

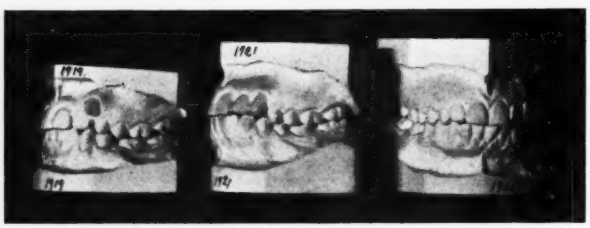


Fig. 10. Fig. 11. Fig. 12.

expansion in the anterior region, as is clearly shown in Fig. 12, from an impression taken four years after the removal of the retainers. It seems probable that the malocclusion was a result of early loss of deciduous teeth. Concerning the prognosis for cases of this kind not much need be said, as the problem is mostly one of a sufficiently early treatment and of technical ability.

As has just been mentioned, Brash demonstrated a steady addition of new bone under the roots of the teeth, corresponding with the growth in the other portions of the face. But we are sometimes able to discover early pathologic disturbances in the immediate surroundings of individual teeth. In such cases it may happen that at the point in question the bone growth ceases or is at least very slight. As the general vertical growth proceeds, the occlusal level of the normal section of the dental arch rises, but the tooth or teeth in the diseased section lag behind. After a few years these last-mentioned teeth seem to have crept into the jaw. Fig. 13 is a case of this kind, Fig. 14 shows a mandibular retainer in position, Fig. 15 was taken five years after the removal of the retainers. As we have not yet discovered the nature of the pathologic changes causing this local disturbance, or the degree of probability with which it will be followed by a retarded vertical growth, it would not be fair to let the operator be responsible in a case in which the result of a carefully conducted orthodontic treatment has become more or less disturbed by patho-

logic changes. Disappointments of this kind may be expected when the pulp has been removed before the apices of the roots are fully formed, and generally occur in cases of early and extensive caries in first molars and traumatic injuries of maxillary centrals.

Distoclusion.—In a paper published in 1925 I have given some reasons for considering distoclusion as a local momentum of malocclusion. A very strong argument was found through the discovery of a case of monochorial twins, one of which was a case of neutroclusion and the other a case of distoclusion. Also the investigations of Friel[9] and Schwartz[10] concerning the details of the eruption of the first molars into their correct mesiodistal relations are of a character to support this assumption. According to my statistics of 1923, it is possible to correct distoclusion successfully in about 83 per cent, to improve the condition in 12 per cent. In 5 per cent there was no improvement whatever. The data I have collected since then have not materially changed this percentage.

Fig. 16 is a case of bilateral distoclusion. There was also a probably local growth disturbance in the region of the left maxillary incisors and canine. The distoclusion was corrected without difficulty and was easy to retain. But

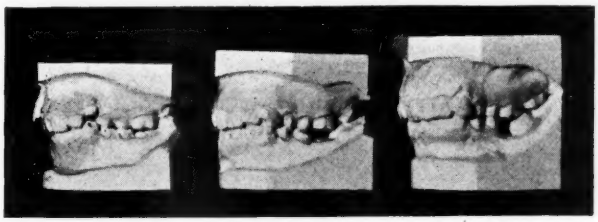


Fig. 13. Fig.14. Fig. 15.

the region around the left incisors and canine gave me a good deal of trouble, and it became necessary to re-treat this region, as the teeth would not accompany the general vertical growth of the other portions of the alveolar process. Although the condition shown in Fig. 17 is good, I shall not be surprised if further difficulties are in store, depending on whether the vertical growth of the face has attained its completion or not.

The characteristics of distoclusion that I have mentioned in the foregoing seem to confirm the hypothesis that this momentum is the result of a functional feebleness, and to the best of my knowledge it was Sim Wallace who was the first to advance this idea. I have, however, never been able to find that distoclusion is necessarily accompanied by a subdevelopment of the body of the mandible. But if the nature of distoclusion is what I have stated, then it must be considered as being in keeping with science and experience to treat this anomaly by moving the mandibular arch in an anterior direction. Should the attempt prove unsuccessful, we have no right to declare that any mistake has been made, any more than when an established method of treating a disease fails to effect a cure.

Strange to say, we occasionally find the suggestion to treat distoclusion with help of the extraction of the first maxillary premolars. The objective is then to leave the distal position of the mandibular arch unchanged and restrict

the movement to the six anterior maxillary teeth. After a number of experiments with this technic in cases in which for other reasons the routine method could not be used, I have arrived at the following conclusion: it is suitable only in those cases in which the region above the maxillary apical plane is too small, or, if expressed in the terminology of Franke, the height of the apical arch is too small. In other words, the *apices* of the maxillary incisors and canines are not (or very little) too far forward in relation to the mandibular teeth. Another drawback with this method is caused by the frequently occurring deep overbite. The distal position of the mandibular arch is to some extent compensated by the defective maxillary base, and this underdevelopment is manifest in some form of crowding in the maxillary arch. Extraction is justified in these cases if besides the distoclusion some form of apical crowding is present in the maxilla. An interesting case of this character has been published by Weinberger.[12]

The large percentage of successful treatments of distoclusion I have on record, which is also confirmed by the comparatively large number of cases published by others, ought to have this result, that omission to attempt to move the mandibular arch in an anterior direction can hardly be excused,

Fig. 16. Fig. 17.

unless the distoclusion is accompanied by the above-mentioned momentum of crowding. There is, however, a small number of cases, according to my statistics about 5 per cent, in which the ordinary treatment with intermaxillary force, "Baker anchorage," does not succeed at all, and 12 per cent in which it only partially succeeds.

Rogers[6] has published a case concerning which he states that the usual methods of treatment had been used for several years without result. By means of his muscle exercises he succeeded in training the patient to a correct occlusion in a remarkably short time. But even if cases be found in which not even the Rogers method will produce the desired effect, we are not entitled to charge the operator with the failure. It is not the fault of the operator, but, as it seems, a rather uncommon peculiarity in the individual case. However, before starting treatment the operator ought for safety's sake to call the patient's attention to the fact that in a small percentage of distoclusion cases the prognosis is unfavorable.

The types of malocclusion we have just discussed are characterized by apical bases of sizes harmonizing with the coronal curves. In one of them the permanent result of the orthodontic treatment was disturbed by apparently pathologic conditions above some individual tooth or teeth. In the malocclu-

sions, the prognosis of which we are now going to discuss, the growth disturbances are seemingly located in the normal growth sites of the jaws. The result of these disturbances is manifest in a disharmony between the coronal curve and the region beyond the apical planes. These cases are real jaw deformities, distinguished by a super- or a subnormal activity in the growth sites.

But when, for instance, we speak of a supernormal activity in any of the growth sites, we must not forget that this expression is subjective, and that what *appears* to be a supernormal activity perhaps in reality is not at all a manifestation of a greater specific rapidity of the bone growth but is only rapid in proportion to the growth rate in other sites. There is also another possible explanation. We may be allowed to suggest the hypothesis that certain jaw deformities are not due to any abnormal rate of growth but are the results of, let us say, an idiovariation or a mixovariation, with the deformity present in the embryo.

Keith and Campion[11] discovered a certain parallelism between the normal and the acromegalic growth of the face. It is not difficult to find a certain correspondence as regards the normal growth sites, which have been discovered by Brash, and such points as would seem to be involved in the genesis of the jaw deformities. According to this author the jaws grow by means of alveolar growth, suture growth and periosteal apposition and resorption.

A point of view of very great importance as to the most suitable age for orthodontic treatment is this. If the types of malocclusion we are now discussing are manifestations of a supernormal or a subnormal activity in the growth sites, then we must a priori expect that this tendency to develop an abnormal form of the jaws, resulting in malocclusion, will be apparent during the whole growth period of the jaws, exactly as in the case shown in Figs. 13, 14, and 15 the pathologic process prevented the tooth involved from following the rest of the teeth during the general alveolar growth.

Let us assume that we have successfully treated a jaw deformity at an early age. We have no doubt accomplished something, but if that something cannot be looked upon as a pathologic condition that has been cured or has in some way been transformed into a normal condition, then it seems to me that we may expect a relapse. And then we ought to consider heredity as a possible etiologic factor.

The common occurrence in certain families of bimaxillary crowding, excessive alveolar growth in the maxillary incisal region, mesioclusion or opistognathism, suggests that these momenta of malocclusion may be regarded as hereditary variations. An hereditary variation is not a result of the surrounding conditions, is consequently not due to a pathologic process that has arisen from external effects, is not the result of dietetic disturbances, and is not caused by abnormal function.

As to the orthodontic treatment of cases like these, we may suggest the following simile. Let us assume that from reasons similar to those which often influenced the late Dr. C. S. Case, we attempted to change a case of normal occlusion to something else, as for example by enlarging the arch by means of expansion and insertion of artificial teeth, or we might reduce the arch through extraction and a following "contraction." It seems probable that

the changed position of the teeth could not be maintained without some form of permanent retainer, because the original condition was the only one the anatomic and physiologic milieu would tolerate.

We may find that in certain slight cases of, for instance, bimaxillary crowding, it is impossible to get permanent results without some form of permanent retention. It will accordingly be our duty to consider whether the relapse is not a result of a similar cause, viz., that we have made an artificial encroachment upon the most natural balance between the apical and the coronal curve for the individual in question. We will then have to reconsider the indications for our treatments and will perhaps discover that they will have to undergo a radical change.

If an extensive investigation of cases of bimaxillary crowding at different ages should prove that perhaps 80 per cent were self-correcting, and a similar examination of corrected cases had shown that 20 per cent could not be retained without permanent retention, then we must admit that it is rational to suspect that the 80 per cent successfully treated cases correspond with the 80 per cent self-corrected ones. This would mean that the treatment had been superfluous.

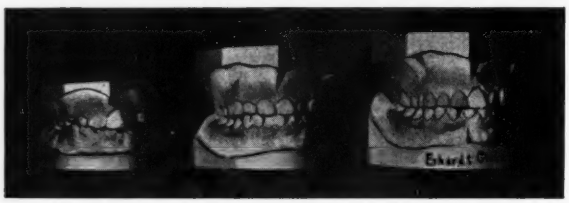


Fig. 18. Fig. 19. Fig. 20.

Bimaxillary Crowding.—We will now discuss a few reports of cases of jaw deformities, and we will begin with the bimaxillary crowdings, a variety of malocclusions that has caused me great disappointment. Malocclusions of this kind are rather common. Since the year 1900 when Angle published the sixth edition of his book—his method of treating them without extraction—the great majority of writers having anything to say about these cases have recommended the same plan. However, at the time, or 1900, Angle himself was by no means so decided as to the universal retention of the full complement of teeth as he has become since, and as he still is in his more recent declarations. In the textbook in question he describes a case (Figs. 186 and 187) concerning which he says (page 199): "It will be readily seen from a study of this case that the upper jaw was naturally diminutive in size, giving marked labial inclination to all of the anterior teeth, even in their crowded condition, and that moved into correct alignment their protrusion would be exaggerated and the result impracticable."

Angle's command that the whole complement of teeth be retained seems to have been very generally obeyed. Several statements (as for instance by Kelsey[12]) have been made that it is by no means unimportant at which age the treatment has been performed, and there is a pretty general conviction that if an expansion is performed at a very early age, say five to seven years, then the

result will be permanent. I have previously criticized the theoretical basis on which this method of treatment is founded.

The clinical evidence that has been published is meager. When in 1923 I published some results of my orthodontic experiments, I indulged a modest expectation that the Angle School, by means of a crushing evidence, would give definite proof that expansion of crowded dentures of this type was a method giving permanent results. This has not been done. I have since that year searched through, I suppose, most of the existing literature on this subject but have succeeded in finding only four cases with permanent results. Two of these have been published by Chapman (INTERNAT. J. ORTH. ORAL SURG. RADIOG. **9**: 339, 1923; **10**: 287, 1924) and one by Baker (**9**: 203, 1923). This last case is evidently considered as being remarkable, as it was republished later. We have also a case by Kelsey (INTERNAT. J. ORTH. ORAL SURG. RADIOG. **9**: 532, 1923). Barnes, who has probably shown the most reliable material exhibiting results as they appear many years after the removal of the retainers, has published six cases with partial relapses (INTERNAT. J. ORTH. ORAL SURG. RADIOG. **9**: 721, 1923).

Fig. 21. Fig. 22.

Fig. 18 is a case of bimaxillary crowding. A remarkable amount of abrasion seems to me to indicate that the intensity of the masticating function is somewhat more intense than is now generally to be found. Fig. 19 is the same case after treatment, and Fig. 20 shows the condition six years later. When we find in a case like this that neither the stress during mastication nor the early treatment could secure the desired result, we are inclined to attribute permanent results, as in Chapman's cases, to something else than the orthodontic treatment.

The case illustrated in Fig. 21 is a malocclusion (Fig. 22) one year after the removal of the retainers. Two years after the removal of the retainers, it was reexamined, and as far as could be seen the occlusion was identical with that in Fig. 22. In my opinion the satisfactory result is a consequence of the fact that the momenta of malocclusion in this case are local, that is to say, are dislocations resulting from early loss of deciduous teeth, distoclusion and secondary crowding of the maxillary incisors. This is consequently not a case of bimaxillary crowding and is not characterized by a subdevelopment of the basal portions of the jaws. It is not a jaw deformity but a conglomerate of

local displacements. The treatment has accordingly been limited to a changing of the positions of the teeth on normal bases.

Deficient Alveolar Growth.—The case illustrated in Fig. 23 was characterized by an abnormal narrow maxillary arch and infraocclusion in the left premolar region. It was corrected by means of an extensive use of vertical intermaxillary force (Fig. 24). Seven years later it was examined (Fig. 25). The infraocclusion has returned, probably on account of a deficient alveolar growth in the same region. It seems probable that it is to be explained in this way: since the time when the correction was completed the vertical growth of the face has gone on, without any compensating growth at the originally deficient growth sites.

Excessive Alveolar Growth.—In accordance with what has for a long time been accepted teaching, the case (Fig. 26) was treated at an early age, and normal occlusion was readily attained. A year or so after the removal of the retainers the condition was reexamined. The mesiodistal relations were correct, distoclusion being a mere local affair and as such amenable to a local treatment, but the deep overbite, the lengthening of the incisors, and the spacing had returned. This anomaly is a common occurrence in the patient's

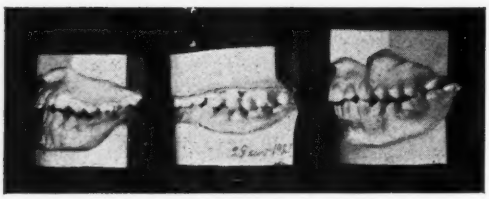


Fig. 23. Fig. 24. Fig. 25.

family. If the original condition, that is, minus the distoclusion, is to be looked upon as a manifestation of a—from the viewpoint of normality—disharmonious alveolar growth, then we must expect to find that the disharmony will have a tendency to reappear during all the time throughout which the vertical growth of the face is going on.

Mesioclusion.—The most prominent opinion concerning the nature of mesioclusion is that if it is treated at a very early age, say at five or six years, the object of the treatment will be attained, and even pronounced types of "progenie" will be prevented from developing. A very typical sample of this simplification of the problem was presented in an advertisement in a leading dental journal in the year 1921, under the heading "A Little Study of Malocclusion." It was clearly proclaimed in the text accompanying the illustration that if the patient to the right had been treated at the same age as had been the case of the one to the left, the tremendous deformity would never have developed.

I have on several occasions published material with the object of proving that the treatment that has been founded on this theory is sometimes inefficient, and that in these cases a temporarily attained normal occlusion is incapable of preventing the deformity from reappearing. The results of the studies of the growth sites of the mandible, begun by Hunter and Humphries

and completed by Brash, seem to me fully to confirm this view. At least a considerable number of cases of mesioclusion are distinguished by the mandible exhibiting a greater increase in growth than the maxilla. In normal cases, as shown by Keith, Campion and Brash, the combined apposition and resorption effecting the growth of the jaws in a sagittal direction is dimensionally the same in this sense, that the occlusion is not changed mesiodistally beyond the limit of the normal. But in some cases of mesioclusion the growth of the maxilla is overcompensated by the growth of the mandible, and the body of the mandible with its dental arch advances forward in relation to the maxilla.

Campion and Keith are of the opinion that in such a definite pathologic phenomenon as acromegaly the sites of growth are the same as in normal cases. In conformity to this view it seems probable that in cases of mesioclusion or "progenie" the supernormal growth consists in an active remodelling of the bone in those sites in which the horizontal growth of the mandible normally takes place.

Now, do we know anything about the causes of the horizontal growth of the mandible? We have long since known that certain local stresses effect certain changes in bone surfaces, pressure causing resorption and tension

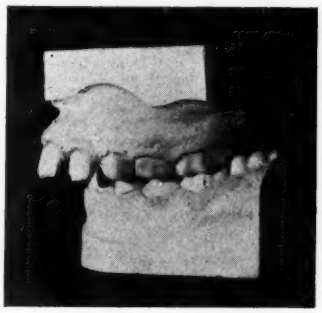


Fig. 26.

causing apposition. But both these processes are also results of endocrine activity. An instance of the capacity of this latter factor of dominating over local apposition has been given by Brash, who describes how in the pig in the area between the orbital margin and the opening of the infraorbital canal, "the general forces at work in modelling the bones are greater than any local influence that may be exercised on the growing bone by the pull or the growth of the muscles."

We have not yet discovered the reason for the relative ease with which in cases of distoclusion the mandibular arch can be made to move forward as rapidly as, for instance, in the case of Figs. 3 and 4, seven millimeters in eight months. It seems highly improbable that the forward movement is caused by a rapid horizontal growth of the mandible with apposition at the posterior border, etc., set going by the use of intermaxillary rubbers. And if even this is improbable, that the increase in function that could be imagined as resulting from the use of intermaxillary rubbers should be able to exert such a powerful influence on the horizontal growth of the mandible, then it must seem still more strange that a similar acceleration of growth does not occur in the maxilla.

We thus arrive at the conclusion that the excessive mandibular growth in certain cases of mesioclusion is not functional, if we define functional bone growth as a growth caused by a certain intensity of muscular function, and which accordingly would not take place if this intensity were not attained. But if it is not functional, it must be a result of what Brash calls the "general forces at work," and in that case it must be a result of endocrine activity.

Only a very mechanical view of the orthodontist's problems can claim that it is possible to prevent the endocrine secretion from influencing the growth of the mandible by means of mechanical methods, traction and pressure strains on the teeth and the like. The very definite assertions in this direction have not been accompanied by any real clinical evidence. Although decades have passed since these assertions were first made, and there has consequently been ample time to collect material to prove the final results, this has been omitted.

A similar remark must also be made concerning another theory, that of Rogers, that in cases of mesioclusion the corrected occlusion may be secured by means of muscle exercises. Unless these exercises can influence the endocrine activity itself, which a priori seems very improbable, this method to

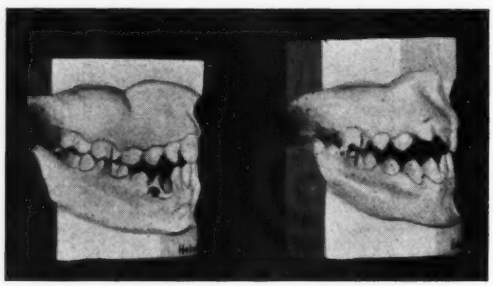


Fig. 27. Fig. 28.

treat mesioclusion must be without the result we expect. A temporarily and locally active force may certainly counteract and neutralize the result of another force. But if the activity of the latter is continuous and remains active after the former has become passive, it will in the long run prevail.

A critical review of the material that has been published concerning the results of the orthodontic treatment of mesioclusion must lead to the conclusion that even a very early treatment may be without the desired final effect. Nevertheless, we find in textbooks and published articles so many recommendations of the early treatment, that there is much to excuse the inexperienced practitioner if his treatments prove failures. To be on the safe side the operator is advised before starting the treatment of an early case of mesioclusion, to inform the patient that his case may be of a progressive character. But as it is impossible to make a reliable estimate of the final degree of the deformity, an early treatment has certain chances to succeed. The operator ought not to take the responsibility for the final result, as the cause of a failure is not to be found in the technical execution but in anatomic conditions beyond the reach of the mechanical treatment. I would also recommend that the operator inform the patient that we have at our disposal, as a last but very reliable resort, the surgical resection.

In the cases Figs. 27-28 and 29-30, the disharmony between the maxilla and the mandible became worse during the treatment. In both cases we have an arrest of development in the incisal region of the maxilla, so it is difficult to decide whether the disturbance is to be considered as a combination of opistognathism and progenie or opistognathism alone.

Besides the malocclusions we have as yet described there are several others of great interest: for instance, one characterized by a diminishing transversal width of the mandibular arch and another exhibiting progressive transversal growth. As it is not long ago since I gave descriptions of these malocclusions, we will pass them over this time. There are models of both these anomalies exhibited in the collection.

The views that have been presented in this paper will certainly not be endorsed by all the members of the society I have been given the honor to address today. But I would like to call your attention to certain facts that seem to give an indirect support to the views I have presented. The extensive use of removable retainers, the tendency to resort to extraction, the desirability

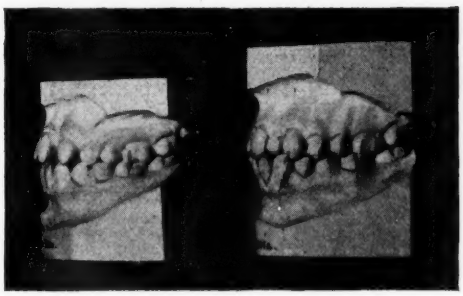


Fig. 29. Fig. 30.

of using inconspicuous appliances, a result of the very protracted treatments—all these circumstances indicate that in a number of cases we have been, so to say, struggling with fate itself.

Regarding the responsibility for failures, the following may be said. In the majority of states the practice of dentistry is a legal monopoly, and the instruction in the art or at least the licensing body is in some way under the control of the state. The state has consequently a certain responsibility as to the competence of the licensed practitioners. It is the licensed practitioner's duty to act in accordance with the instruction he has been given. If the result of his therapeutic action is something else than what it ought to be according to the official instruction, the fault is the state's, and the state ought to be the party to suffer for the results of its faulty teaching.

The student is now given the instruction that mesioclusion and certain other anomalies ought to be treated at an early age, and that to postpone treatment is wrong. If an operator has acted according to this rule, and it is later discovered that the official position is wrong, he ought not to be made responsible for the result of the official teaching. As a matter of fact he has simply acted in accord with what at the date in question was supposed to be consistent with science and confirmed experience.

In a case of a judicial controversy between operator and patient where expert opinion has been consulted, the expert ought to stand by the operator, at least until we get a textbook with reliable information concerning the possibilities and limitations of orthodontic treatment.

In order to obviate the necessity of such an eventuality every careful operator should, before starting treatment, present a reservation with something like the following wording:

"At present the possibilities of orthodontics are confined to local movements of the teeth. We have no evidence to prove that our operations will influence the region beyond the apical plane. The permanency of the result may consequently become more or less deranged by an abnormal development of this region. In cases in which the malocclusion is a manifestation of a developing jaw deformity, hereditary or not hereditary, the desired and perhaps temporarily attained result cannot be guaranteed."

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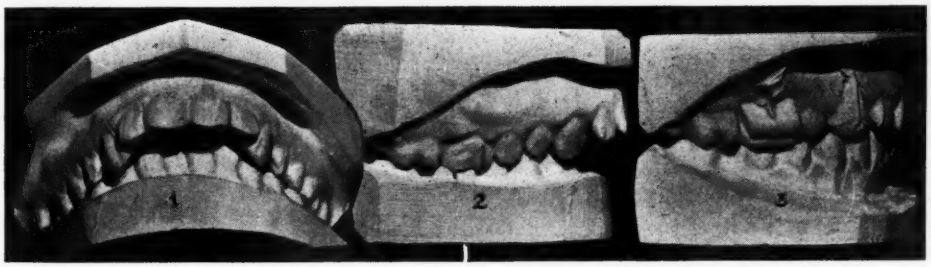
A RARE PRACTICAL CASE*

By Dr. C. M. C. Dullemond, Utrecht

AS ONE of the youngest members of our Society, I feel it as a great honor that my name is on today's programme. The case, from which I am going to show you slides, did not look particularly interesting at the beginning, nor will it to you. I had to deal with a Class II case, which was probably developed by thumb-sucking in childhood.

Fig. 1 and Fig. 2 show the case as I started treatment in August, 1925. As the lower arch was in normal relation to the facial outline of the patient, a girl of nearly fifteen years, I decided to extract the maxillary first premolars and to bring the six anteriors backward. Fig. 3 shows the case as it is today. You see it nearly finished, with exception of some details. The things peculiar to the case are not in the fact that I had to treat a Class II

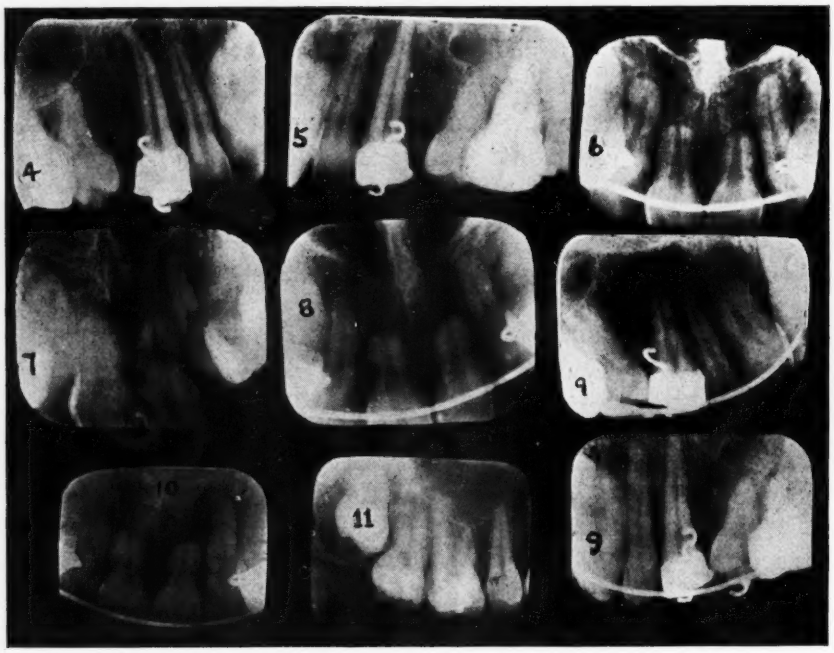


case, but in the bone formation and tooth development. Nearly four months after extraction of the premolars I took x-rays for controlling that area, because the teeth were moving so quickly (Figs. 4 and 5). You see a large area of translucent bone structure, very poor bone formation in the alveolus of the extracted teeth, and the roots of the central incisors look as if resorption has taken place. On account of these pictures, three weeks later I took one of the four anteriors in straight projection (Fig. 6). You see very plainly a wide translucent area of bone, but I will ask you to examine closely the roots of the central incisors. They seem very short, but to me they look as if some extension of tooth structure goes on in the dense bone. To make sure that there was no resorption caused by my treatment I show the slide (Fig. 7) of the anteriors before treatment started. I then looked upon them as a shortened projection. Though they stood firm in their sockets I feared to loosen them, so I stopped actual treatment for a short period and advised the mother to give the girl cod liver oil. I did this under influence of the splendid paper which Mrs. Mellanby of Sheffield had delivered, in the fall of last year, before our Society in Holland, about her research work of the influence of cod liver oil upon structure and development of teeth and bone. Three

*Read at the Congress of the European Orthodontological Society.

months after the girl had taken cod liver oil daily I took another picture (Fig. 8). The translucent bone area seems somewhat narrower; I dare not say that this is the result of the cod liver oil, but Fig. 9 and Fig. 10 show the x-rays taken last Saturday. I think the difference in density is less than before. When you look at the extracted premolars you see that the enamel is not bright and shiny—the enamel of all the teeth is like that—and the mandibular first molars show some hypoplasia; all indications of poor tooth structure. When you let the light pass through the roots of the premolars one sees an abnormal translucency.

Regarding the x-ray of the maxillary first molar (Fig. 11) is looks to me that the buccal roots show a peculiar form, which may also indicate translucent apices. Referring to the very interesting article of Dr. Erward L.

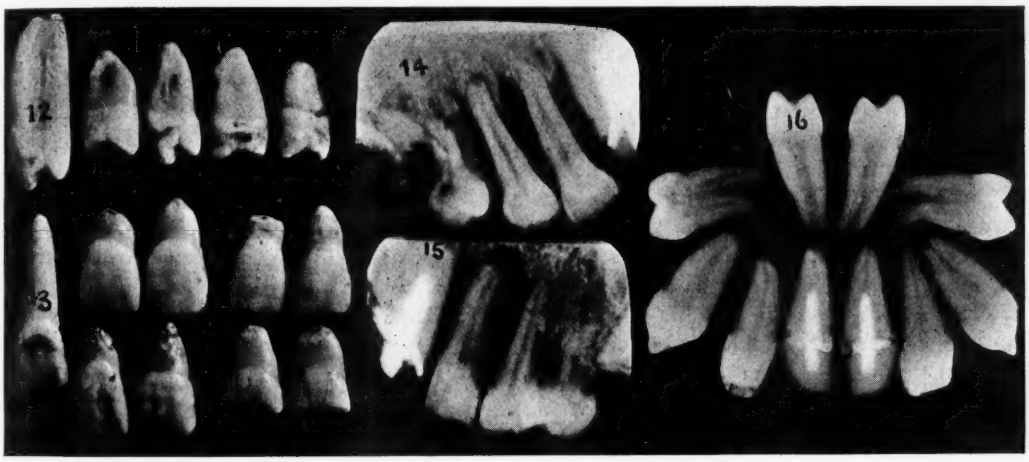


Miloslavich of Milwaukee, who is a pupil of Prof. Erdheim of Vienna, in the February issue of last year of the INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY on "Calcium Metabolism in Its Relation to Dental Pathology," I want only to quote these sentences: "The most marked changes in the disturbed calcium balance in the growing human organism are usually seen in the incisors. This fact we will try to explain with comparisons and findings from the pathology of the osseous system. In the study of bone calcification, in cases of rachitis one may find that the greatest amount of lime salts is deposited in those parts most used, whereas the greatest amount of osteoid tissue can be seen in those places least employed. The same *rule of calcium deposition* is to be applied to the tooth. The human incisors are the teeth which are used the least, and therefore show the most pronounced disturbances; the molars on the contrary perform most of the work in act of mastication, and therefore possess a heavier lime salt deposit. Simi-

larly in the case of rachitic rats, the teeth most exercised show a better saturation with lime salts."

In this case we have to deal with a somewhat rachitic child, who is still what you call a frail girl and needs physical culture. The central incisors are not used at all on account of their position by thumb-sucking.

I discussed the case with Dr. Van Loon of Utrecht, who believed the roots were short. He has seen that sometimes with protruding teeth, and showed a collection of such specimens. Dr. Van Loon was kind enough to allow me to have a slide made of some of them (Fig. 12 and Fig. 13). For comparison a normal tooth was placed beside them. Until I had my slides made I was not quite convinced my centrals had such short roots. But it seems plain when one sees two slides stereoscopically. In relation to roots of rachitic teeth, I am able to show you some more. The other day a lady of about thirty years



came in with a very bad attack of pyorrhea (Fig. 14 and Fig. 15). I could not save those teeth, and had to extract eight of them. All roots were pretty short, and those of the premolars showed a very poor saturation of lime salts, the others only a little bit at the apex, but there was no protrusion of the maxillary teeth. On the x-ray I made from the extracted teeth (Fig. 16) they seemed to have very wide pulp canals, but that is simply a poor saturation of lime salts. As the x-ray picture does not show the interesting points, I placed those teeth upon a glass slide so that one can see the light pass through.

Mr. Chairman, I dare not make any conclusions, neither can I contribute anything to solve the problem of calcium metabolism of the teeth, but I thought the facts interesting enough to bring them before your audience and also to show once more how necessary it is to have x-ray pictures from all the teeth and to study them carefully before starting treatment of an orthodontic case.

DISCUSSION

Dr. Hipwell thanked Dr. Dullemond for her paper. It was the first time a lady had read a paper before the Society. He desired to encourage her in every way and hoped she would continue to give more papers. The present paper would give all the members much food for thought and study.

Mr. Northcroft added his congratulations to those of Dr. Hipwell. It was very encouraging to see that such a problem had been approached from the scientific point of view. All the members knew the difficulties of the study of calcium metabolism, and they had that afternoon seen one of the results of that modern treatment in a practical case. Dr. Dullemond seemed absolutely to have proved the result of her carefully thought out treatment by the deposition of lime salts which had taken place in the interdental space between the central incisors. It only went to show how much broader the field of orthodontia was becoming when it was necessary not only mechanically to move teeth into position, but also to endeavor to treat patients on scientific lines so that those results might be maintained in satisfactory permanency. The reason for the extraordinary shortness of the central incisor roots was very difficult to discover, but he might suggest that as the girl was fifteen years old, and as she suffered from what was known as Angle's Class II, Division 1, it was possible that she might have been a mouth breather as well. She might in addition have suffered from gingivitis, and consequent septic absorption round the necks of the teeth, and that the absorption of those roots was just as much a septic process as was found in the roots of the teeth of the lady who was suffering from obvious periodontal disease where the roots were definitely absorbed. He did not see why one should not reasonably think that the same process might have been at work in both cases.

Dr. Hans Hecht said he would like to have seen photographs of the patients, full face and profile, before and after the regulation.

Dr. Levin said he was very pleased that Dr. Dullemond advised that patients should not only be treated by the regulation of their teeth, but also that their general health should be looked after. It should always be made a point that a patient should be in a good state of health before any operation was undertaken. He had treated a good many children and had always advised the parents to nourish them well before treatment was started. For the last two years he had advised the use of cod liver oil, and had had very good results from it, not only with children, but also with adults. Especially was that so in the matter of pyorrhea. He was experimenting now on other patients and would be pleased to let Dr. Dullemond know the result in due course.

Dr. Dullemond said she had not brought any photographs, because it had not been a question of treating a Class II case but only a matter of bone formation about which she had been talking. Therefore she had not thought it necessary to bring the photographs which Dr. Hecht had mentioned.

DENTAL ORTHOPEDIC GROWTH STUDY*

A Preliminary Report of the Research on Growth and Development of the Dental Arches Being Carried on at the Merrill-Palmer School at Detroit, Mich.

By Dr. Samuel J. Lewis and Dr. Ira A. Lehman, Detroit, Mich.

THIS exhibit consisted of a record of the growth and development of the dental arches of 98 children ranging in age from two and a half to seven. It was illustrated by plaster casts taken once a year, width measurements taken twice a year, and full case histories. In addition were shown radiograms of the wrist bones and the method of correlating the bone age with the growth of the dental arches.

While this work has been carried on for the past two years, there is nothing of a definite character that can be reported. It will take from five to seven years to gather the necessary evidence from which any deductions can be made. However, great possibilities are evident for we will, for the first time in dental history, be able to draw a growth curve for the dental arches that can be correlated with the general growth curve of the body. As none of these cases will undergo orthodontic treatment, we will be able to determine whether or not growth is the same in cases of normal occlusion and malocclusion. By consecutive models taken one year apart we will have a record of the changes that take place in the arches incident to growth and development, and this will furnish a record, tangible in character, that can be handed down to posterity. Many of these models were shown at the exhibit.

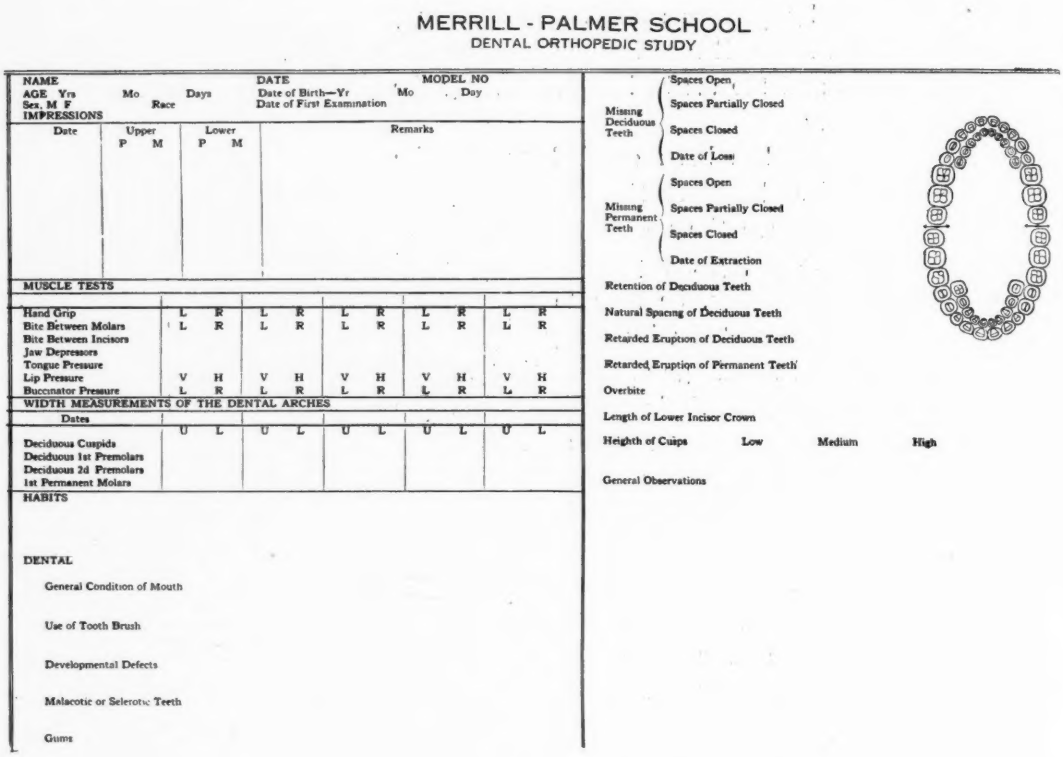
A chart was shown of an individual over a period of two years depicting the width growth of the dental arch, and this was superimposed upon the general growth curve of the same child. This was merely to illustrate what sort of work will be done with the group under study. In this particular case the dental arch remained stationary while the general growth of the body in height and weight exceeded the expected. This may be a very significant fact, for after a study of many cases over a period of ten years we are sure to find that at some time the growth curve of the dental arch will undoubtedly take an upward swing, just as the general growth curve did. In other words we expect to establish an expected growth curve for the dental arches just as have the physical growth researchers established one for the general growth of the body.

The value of correlation of physical growth studies was shown by various charts such as are used in the school, and several summaries were presented showing just how we will be able to get at the complete history of not only the child, but the parents as well. These, we hope, will aid us in studying the etiology of certain types of malocclusion. As an example we showed a Class III (Angle) at the age of five and six years in which the condition was

*Read at the First International Orthodontic Congress.

growing progressively worse. As the parents are not anxious for him to undergo orthodontic treatment, we are most fortunate in being able to study this child over a period of years. The history of this case shows that the child is an endocrine case with a hyperpituitary condition. His testes are undescended, and he is much larger than the average child of his age. He shows many traits of feminism, and has been studied in detail by our psychologists. Two brothers, one older and one younger are also being studied by us, and they seem normal in every respect.

The method pursued by our department is as follows: we first make a complete record of all dental conditions, leaving the other records to the various departments in the school. Then we measure the width of the dental



MERRILL - PALMER SCHOOL
DENTAL ORTHOPEDIC STUDY

NAME DATE MODEL NO
AGE Yrs Mo Days Date of Birth—Yr Mo Day
Sex. M F Race Date of First Examination
IMPRESSIONS

Date	Upper P	Upper M	Lower P	Lower M	Remarks

MUSCLE TESTS

Hand Grip	L	R	L	R	L	R	L	R	L	R
Bite Between Molars	L	R	L	R	L	R	L	R	L	R
Bite Between Incisors										
Jaw Depressors										
Tongue Pressure										
Lip Pressure	V	H	V	H	V	H	V	H	V	H
Buccinator Pressure	L	R	L	R	L	R	L	R	L	R

WIDTH MEASUREMENTS OF THE DENTAL ARCHES

Dates										
	U	L	U	L	U	L	U	L	U	L
Deciduous Cuspids										
Deciduous 1st Premolars										
Deciduous 2d Premolars										
1st Permanent Molars										

HABITS

DENTAL

General Condition of Mouth

Use of Tooth Brush

Developmental Defects

Malacotic or Sclerotic Teeth

Gums

Missing Deciduous Teeth: Spaces Open; Spaces Partially Closed; Spaces Closed; Date of Loss

Missing Permanent Teeth: Spaces Open; Spaces Partially Closed; Spaces Closed; Date of Extraction

Retention of Deciduous Teeth

Natural Spacing of Deciduous Teeth

Retarded Eruption of Deciduous Teeth

Retarded Eruption of Permanent Teeth

Overbite

Length of Lower Incisor Crown

Heighth of Cuips Low Medium High

General Observations

Fig. 1.

arch, using Milo Hellman's functional points viz.: the points of the cusps of the upper cuspid, the points of the lingual cusp of the first upper deciduous premolar and the point of the mesiolingual cusps of the second deciduous premolar and first permanent molar, upper. On the lower arch we use the contact point of the distal surface of the cuspid, the distal pit of the first deciduous premolar, and the central fossae of the second deciduous premolar and first permanent molar. These points are used as they represent functional centers and are homologous. In addition to these measurements we are using the standard anthropometric measurements of the width and length of the dental arches, taking the greatest external diameter of the dental arch as well as the greatest length. The latter measurements are taken on the models which are made from artificial stone, while the former are made directly in the

mouth. The compilation of these records will establish the growth curve we are striving for.

In order to check up the work of E. A. Bogue, we have constructed a chart, which was shown, in which each case under study will be tabulated once a year. Using Bogue's norm, which is the minimum of 28 mm. across the palate between the second deciduous premolars, we are tabulating the cases ranging from 23 mm. to 37 mm. As none of these cases will be treated we will be able to tell which cases develop into malocclusion and which into normal occlusion, thereby checking up each case by the measurement of the palate width. About 40 per cent of our cases fall below the Bogue normal. It will be interesting to follow these cases during the next seven years.

During the next year it is our hope that we may start to make yearly extraoral radiograms of each child to study the growth and development of the permanent molars. This study was suggested to us by Dr. J. Lowe Young, after a visit to our school.

Several of the instruments were shown that are being used by us in making the various anthropometric measurements.

A very interesting bystudy developed in our work and that is the effect of premature loss of the deciduous teeth on the growth and development of the dental arches. We discovered, by making accurate models of these cases, and measuring the spaces once a month, a variation in results. One case in which the upper central incisor was lost became smaller after six months, while another got larger. Just why we do not as yet know. In another case five teeth were lost in the lower arch, and for a year and a half after the teeth were lost the space remained the same. These are interesting data, and will yield a fund of interesting information, we are sure.

It is our hope that this study will be carried on by other men in various parts of the world so that in the end we may come together and compare our findings. In this way we feel sure that a great work can be presented to the science of orthodontia; one that is replete with tangible scientific evidence.

DEPARTMENT OF
ORAL SURGERY, ORAL PATHOLOGY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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THE WHY AND THE HOW OF HARELIP CORRECTION

By Vilray P. Blair, M.D.,* St. Louis, Mo.

NOTHING short of one's best could appropriately be offered in connection with any testimonial or memorial effort to Dr. H. W. Loeb who, aside from and beyond his purely surgical attainments, did so much to raise the general standard of medical education in this city. Appreciating the great honor of contributing to this volume, I carefully considered what of the little I have accomplished might in a small way bear some relation to the quality of the great accomplishments of Dr. Loeb.

Nearest to my heart is that lowly subject, the treatment of harelip, which, judged by a comparison of the theoretical possibilities with the average result, one might think to be the most difficult of all surgical operations. I have little new to offer and use methods that were standard in the first half of the last century. Not only have I yet to show a single case disproving Bilroth's statement that there never had been a perfect operative result, but I still not infrequently have results of my own that leave more than a little room for improvement. All that I can claim after twenty-five years of intensive study is, I think, a little deeper insight into the problem, possibly a little better selection and adaptation of methods, as evidenced by a very slow but a continuous improvement in our results, and a still hopeful attitude.

This imperfect showing is here presented, not to parade results, but to emphasize failure and need—not absolute failure, but failure relative to the possibilities—not a need for new methods, but for a deeper appreciation of sound underlying principles, a greater skill in applying them, and the avoidance of false moves.

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The simple closure of the open lip is life-saving because it helps control respiratory infections. A good repair makes not only for better health and happiness throughout life, but materially increases potential usefulness. By a good repair I mean a pleasing appearance with free breathing space that will be followed by approximately normal dentition and occlusion and almost symmetrical contour. I know of no plan that will give 100 per cent good results, but some are better than others. Some plans are too simple to be highly effective, some lack continuity, some are unproductively complicated, and there are still others with inherent vicious possibilities that will lead to their ultimate discard.

Among the basic so-called improvements in method which have been offered in the past half century, the early closure of the lip will, I believe, stand the test of time, even if it accomplished nothing more than to permit

a mother to exhibit her two-weeks-old baby for which she need offer no apology. However, there are other and more permanent advantages of this practice which was popularized by Wolff, Brophy and Lane.

THE NORMAL LIP

A casual examination of the average upper lip in the newborn shows a nose with a tendency to "turn up," symmetrical nostrils sharply bounded below, a lip relatively short from above downward in the midline, and with the mid-point of the vermilion border standing well forward of the chin and usually of the lower lip. There is a medial vertical groove running from the columella to the vermilion border, bounded on either side by a slight ridge. These are emphasized because in the harelip all of them are more or less distorted, and any corrective operation that fails to reestablish them will be proportionately displeasing, and subsequent growth will be more than apt to produce increasing distortion. However, I do not consider it surgically prac-

tical to restore the filtrum, at least one lateral ridge of which is always missing, but if the gross contour of the lip is good this defect is not very noticeable.

It will simplify matters to consider only "single" harelip, which term for practical purposes will here define that part of a single facial cleft that is anterior to the incisor foramen.

THE CLEFT LIP

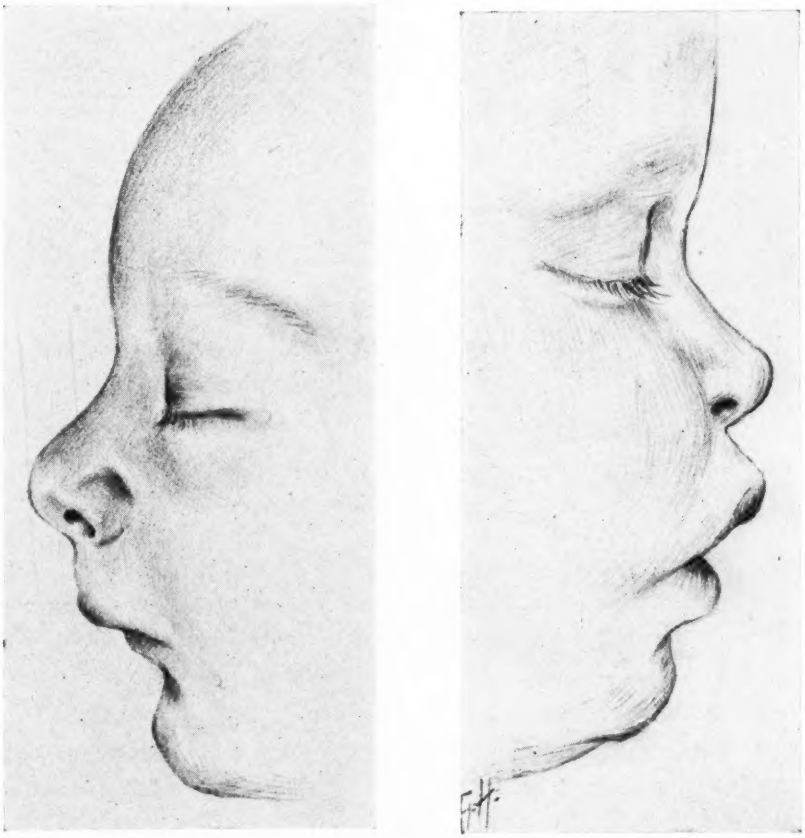
This may be part of a continuous open cleft running through the uvula and the floor of the nose, or a slight notch in the vermilion border with a fault extending up to a widened nostril, or a separation limited to the lip, floor of the nostril and alveolar process. These are differences of degree rather than

of kind, and the treatment of each is basically the same. In all stages there is some actual lack of tissue at the lower border of the lip, some lateral displacement of the two halves of the lip to either side of the cleft, and some flattening of the nostril on the affected side, the degree of each being in some proportion to the width of the cleft. The specific objectives of the operation should be to bring about the best possible immediate restoration of the lip, ala and floor of the nostril. If these are well accomplished subsequent growth should further improve the result by bringing the external nose to the midline and gradually closing the open alveolus, thus giving an approximately normal relation to the dental arches and producing a palate condition that can later be closed by midline suture of the mobilized soft tissues. Any sort of lip closure, no matter how unsightly, will usually be followed by a good approximation between the maxilla and premaxilla, but if the floor of the nostril is made too narrow this produces permanent obstruction; if too wide, it will be followed by increasing displacement of the external nose to the opposite side.

TYPES OF OPERATION

Harelip operations date from the time of Celsus. He and others following him freshened the borders of the cleft, mobilized the lip and cheek by undercutting, and approximated with simple suture. Later the fine points of the art were lost, and even in the eighteenth century escharotics, clamps and bandages were still substituted for the rational treatment of the ancients. It is during the second quarter of the nineteenth century that we find the earlier practices again recommended.

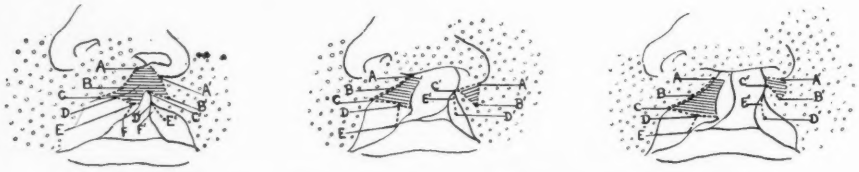
SHOWING FORWARD POSITIONS OF AN OPERATED AND OF A



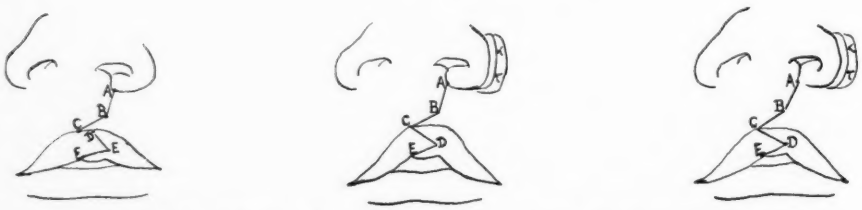
NORMAL UPPER LIP IN THE INFANT RELATIVE TO THE CHIN.

Straight denudation of the cleft borders, which is still extensively used, gives symmetry but tends to make a lip that is long from above downward, at the expense of its lateral width, and with some loss of the desirable prominence of the central part of the vermilion border. The first recorded attempt to improve upon results obtained by the simple straight incisions was published by Husson in 1836. He used the concave incisions, and others have since substituted angular incisions. These latter, together with the Nelaton plan, form a general type of operation in which the incisions on each side of the cleft are still rather symmetrical but which tend to reproduce the natural fullness and prominence of the vermilion by forcing tissue from the cleft borders downward into the lip border.

In another classic type of operation for single lip cleft a vermilion bordered flap is taken from one side of the cleft and turned downward to piece out the vermilion along the lower border of the lip. Of the operations of the latter type I believe the Mirault, published in 1844, is, when skillfully performed, capable of giving a more perfect imitation of the normal pyramidal form of the baby's lip, and this I adopted ten years ago when I discarded the Husson as a routine procedure. The Mirault operation is, however, more difficult to handle than the Husson, Rose or Nelaton, and this fact in itself is a strong recommendation for the simpler type of operation. Of these three simpler operations I think the concave incision of the original Husson is the most plastic. No matter which type of operation is chosen, the individual results will be better and skill will be more quickly acquired if one sticks to a single kind and also develops the habit of accurately measuring and marking before vision is obscured by blood.



SEVERAL COMMON DEGREES OF SINGLE LIP CLEFT ARE SHOWN



AND THE IMMEDIATE RESULTS OF THE OPERATION IN EACH CASE.

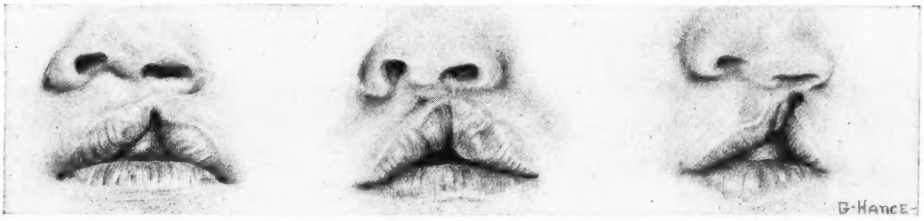
RECORDS

There is nothing that will help one to correct his faults and improve the good points of his operative technic like accurate readable visual records. There are three things that influence a result: first, the quality of operation; second, subsequent scar distortion; third, subsequent growth. As a rule, scar contraction of good noninfected scars is negligible, as it usually lets go in time, and within a year the condition is a replica of what it was immediately after operation. On the other hand, the variety of results that may occur in the earlier part of one's practice can be most bewildering. If one has photographs, drawings and casts of what was done at each operation, and of the condition at the various stages, it will take very much less time and fewer failures to sort out the desirable from the undesirable procedures than if one undertakes to judge from written descriptions and memory. For instance, the forceful approximation and wiring of the maxilla gives an immediate condition that very much facilitates the closure of the previously widespread lip cleft, but our records of these cases during their subsequent growth showed that in a few distressing growth distortions occurred that caused us to aban-

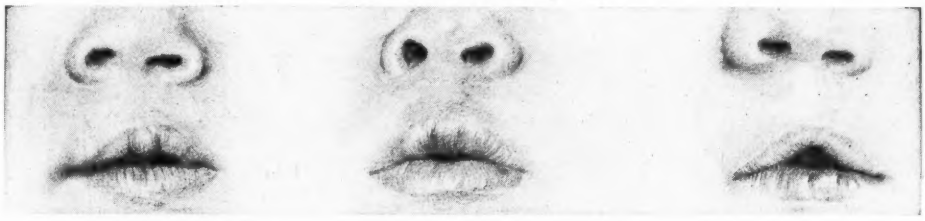
don this type of operation. The five last cases shown on this and the next page were repaired over a wide alveolar cleft. Subsequent spontaneous closure of the bony cleft will largely correct the obliquity of the mouth.

PRELIMINARY MARKING

The marking points are made by pricking with a hypodermic needle or "crow quill" pen dipped in an aqueous solution of methylene blue and are so



IN PROPORTION TO THE EXTENT OF THE LIP CLEFT THERE IS



LATERAL DISPLACEMENT OF THE COLUMELLA AND DISTORTION OF THE ALA.

THE EFFORT WAS MADE TO REPLACE THE COLUMELLA, RESHAPE THE

ALA AND TO CLOSE THE CLEFT WITHOUT UNNATURAL LENGTHENING

placed as not to be eliminated by the cuts; in this way they can also serve as guides in placing the key sutures.

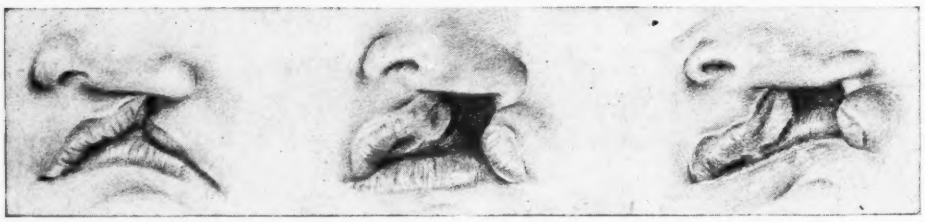
PLANNING

To have results approach the ideal, extreme accuracy is necessary in planning, cutting and suturing; a sixty-fourth of an inch one way or the other will make a noticeable difference. I believe it was my late and revered friend,

Dr. James Thompson, who introduced the use of the compasses or dividers into lip surgery, a practice that cannot be too strongly recommended, but in the final analysis it is the eye that will give the most accurate check. If the denudation incisions are placed too far from the cleft borders, then the sutured lip will be distorted; if not far enough, it will leave an ugly lateral prominence to the finished lip and most likely a notch. Of the two faults the removal of too much tissue is the greater sin, for one can always go back and remove more.

THE NOSTRIL

Whether the cleft is wide open or just a notch in the vermilion border, there will be some spreading of the nostril. If this deformed nostril is carefully examined it will be seen that in most cases it is flattened from before backward in some proportion to the extent of the lateral spread, that



OF THE LIP AND AT THE SAME TIME PRESERVE THE FULLNESS AND

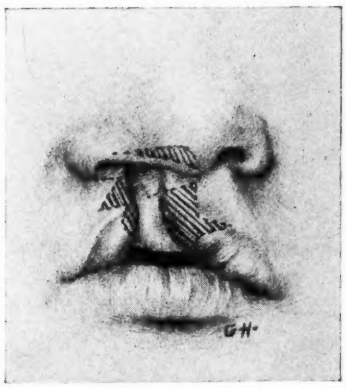
PROMINENCE OF THE LIP AND THE VERMILION BORDER.

the long axis of the opening is rotated away from the vertical toward the transverse. Better results, both cosmetic and functional, will follow a correction that in part rotates the axis of the nostril rather than relying entirely upon removing tissue from the floor.

In infants or young children this rotation can usually be partially or completely accomplished by mobilizing the base of the columella and related nasal mucosa, contouring of the ala, and proper suturing of the floor.

In older children, over three or five years, this simple mobilizing of the columella and septal mucosa may not be sufficient. In such cases the columella is deeply split longitudinally and the half columella on the cleft side, together with the adjoining mucosa, thoroughly freed by deep undermining, preferably without breaking through the septal mucosa. Next the skin of the tip of the nose is undermined and a triangular piece of the latter is removed from above the displaced nostril. This permits the freed half of the columella to be sutured forward, which will allow the displaced nostril to be rotated into its proper position. Replacing the nostril also restores the external con-

tour. Normally the extreme lower end of the ala curves around until it points rather directly toward the base of the columella. In the wide open cleft it may point almost straight outward. With various amounts of spreading, any degree of lack of incurving may be found. In correcting the spread nostril it is essential that the ala be rotated to conform to its fellow. In doing this to an ala that is flat the lining skin will buckle in a way to obstruct the lumen. In order to overcome this and the accompanying droop of the free border of the ala, an incision is made in the lining of the outer wall and roof from the floor to the septum approximately along the upper border of the lower lateral



ADJUSTMENT FOR OLDER CHILDREN

cartilage, and below this cut the skin is freed from the underlying cartilage as far as the free border of the ala. This freeing of the bulging lining permits the apparent surplus to be drawn up into the ventricle and into the outermost part of the vestibule where it belongs, the new relation being maintained by through and through mattress sutures.

It takes all of the above and more to give the best that is in harelip surgery. Today the majority of people are really seriously concerned about their appearance, and facial surgery has progressed to the point where to be acceptable it must be at least relatively pleasing; the mere surgical closure of the lip cleft can of itself no longer be considered adequate.

RESIDUAL INFECTION

By Sterling V. Mead, B.S., D.D.S., Washington, D. C.

DEFINITION

A RESIDUAL infection is an infection that remains either in the soft tissue or in the alveolar bone after the removal of teeth, or after surgical operations of any nature. Residual infections in the soft tissue are usually associated with infections in the underlying bone.

ETIOLOGY

The residual area may be caused by leaving granulomatous tissue, infected root apices, cysts, foreign bodies, loose particles of process, or by failure to properly remove entirely the pathologic tissue. Residual infection may also be the result of the wound healing over too quickly, even though all pathologic tissue has been removed. In this case the wound becomes reinfected through the mouth in the process of healing. A residual infection may occur as a result of leaving an adjoining focus of infection, thereby preventing an operated area from regenerating properly. If areas of this kind are not recognized, a maxillary sinus infection or an infection about teeth adjacent to the operated area may result. It has been the operator's experience that all roots or root apices left in the tissues sooner or later become infected or remain infected and cause an area of chronic osteomyelitis, which may or may not be shown by the roentgenographic or other methods of diagnosis.

SYMPTOMS

Residual infection may or may not cause subjective symptoms. In many cases the patient is unaware that there is anything wrong with his mouth or with the tissues, but he comes to the oral surgeon or to the dentist looking for some foci of infection that may be causing some general systemic disturbance. In some cases the patient may complain of some vague indefinite pain, a pain that may radiate over the distribution of the nerve involved and give no localized symptoms. The patient is unable to describe definitely and accurately just what his trouble is excepting that he has an uncomfortable, or in some cases, a slightly painful condition. Some patients may complain of pain and systemic disturbances, and present for diagnosis of both of these conditions, or simply come for the relief of one or the other of the types. It is very rare that the symptoms become very noticeable, unless a chronic residual infection becomes acute, and then, of course, the patient will have symptoms of an acute infection similar to those in other diseases.

DIAGNOSIS

Residual infection cannot be diagnosed by any one of the different methods used. In order to locate these areas of infection it is necessary to carry out

the general plan of examination, taking into consideration the finding of the clinical, oral examination, the subjective symptoms of the patient, the roentgenograms, transillumination, etc. In many cases the only reliable factor will be the symptom diagnosis, as all of the other factors of diagnosis may be negative. In other words, the patient may complain of an indefinite radiating pain that cannot be located by any of the other methods of diagnosis, and simply upon the line of symptoms presented by the patient an exploratory operation is made, and the diseased area found, even though the roentgenogram appears to be entirely normal, transillumination normal, and other factors normal. In other cases there may be no symptoms that give any hint of the pathologic con-

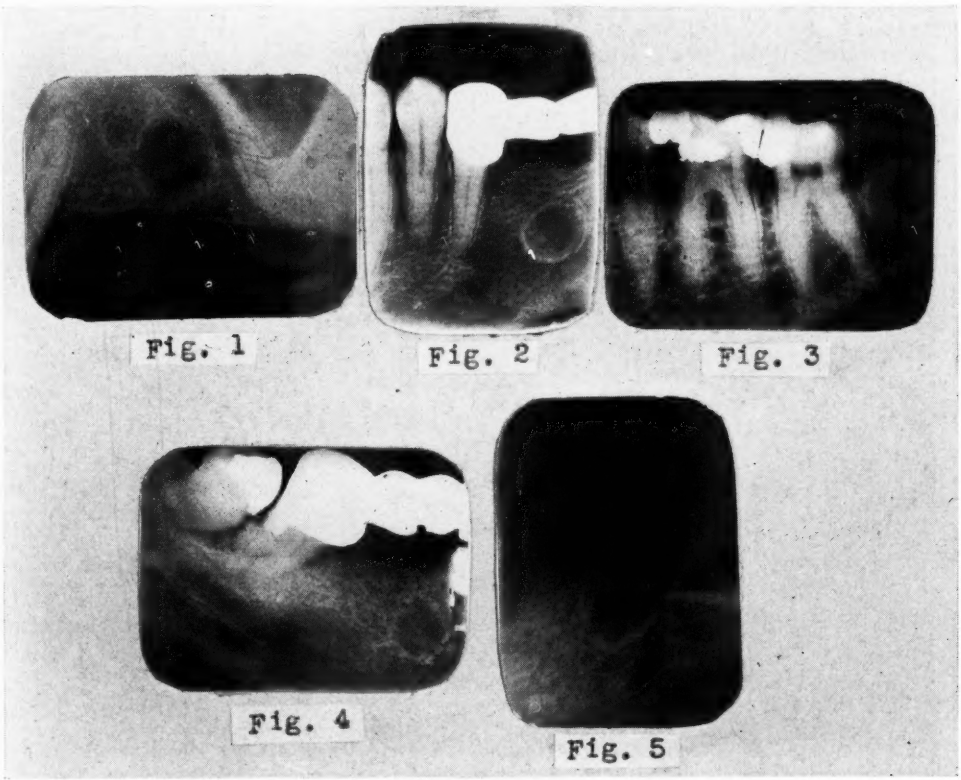
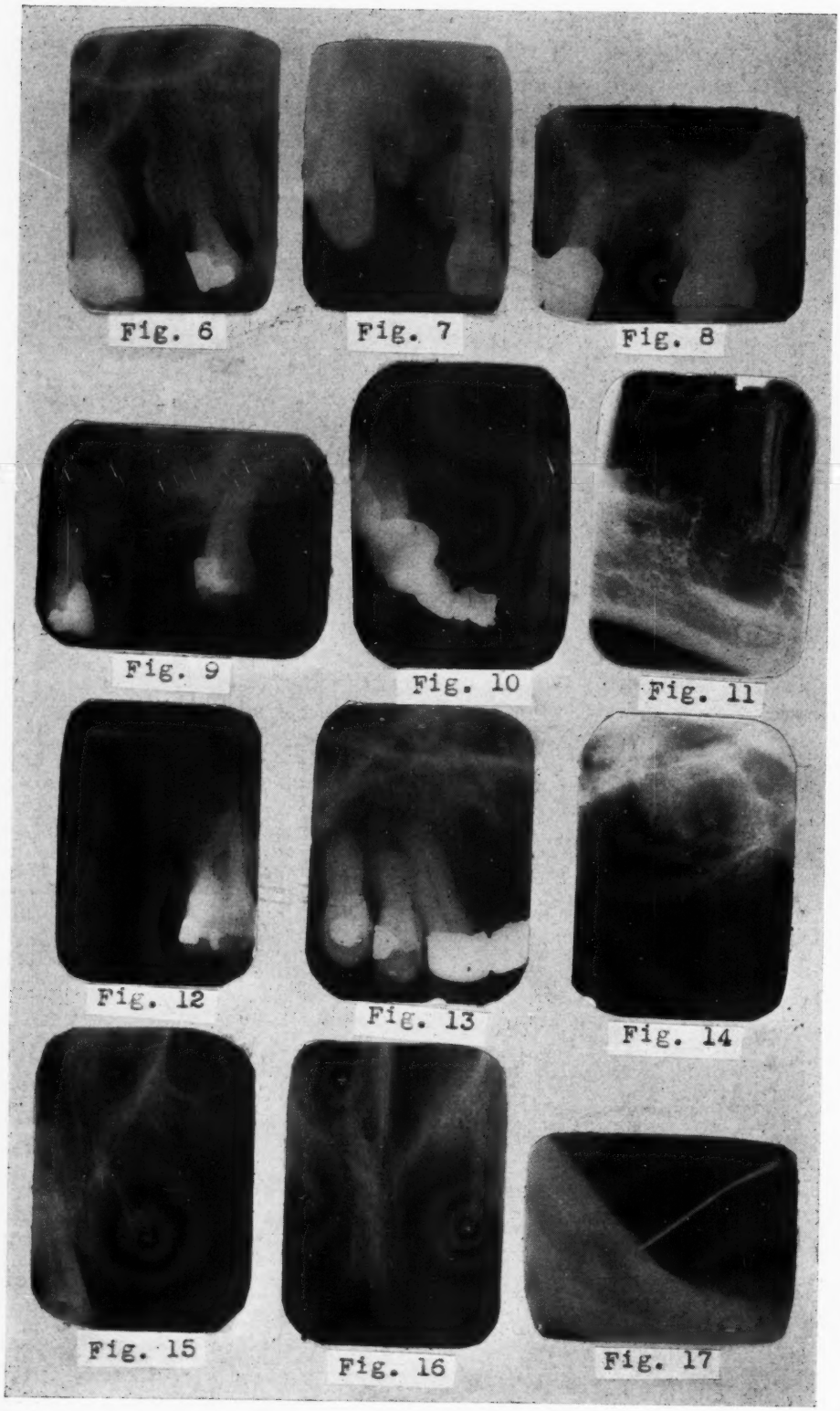


Fig. 1.—Residual cyst in maxillary bicuspid region.
Fig. 2.—Residual cyst in right manibular molar area.
Fig. 3.—Residual cyst in right mandibular molar area.
Fig. 4.—Residual cyst in left mandibular molar area.
Fig. 5.—Residual cyst in right mandibular bicuspid area.

dition and the roentgenogram may be normal, but transillumination may show an area of tissue infection lying over an area of bone involved. Transillumination does not show bone disease, but it shows soft tissue infection. But both soft tissue infection and bone infection may occur, and the detection of the soft tissue infection may lead to detection of the bone disease. A residual infection may be entirely in the soft tissues and be detected by transillumination, but these conditions are more rare. It is really surprising to note just how many cases are found to be infected that show to be normal upon the roentgenogram. This is especially true about roots and root apices left in the bone, as many of these conditions appear to be normal without any bone destruction,



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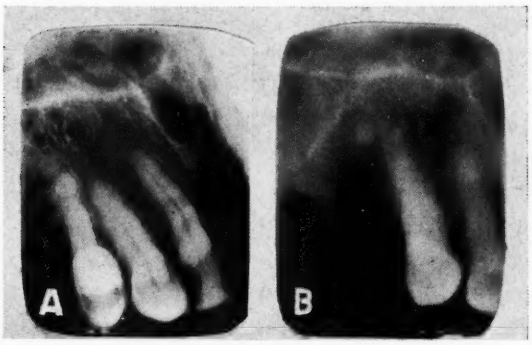

Fig. 18.

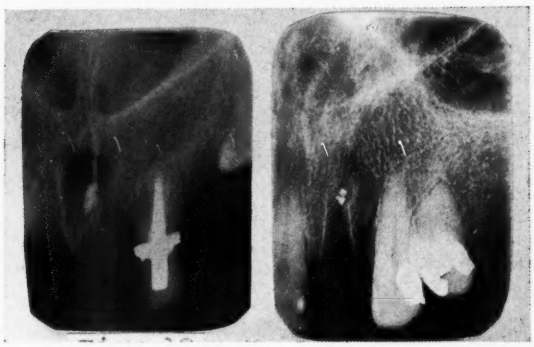

Fig. 19.

Fig. 20.

Fig. 21.

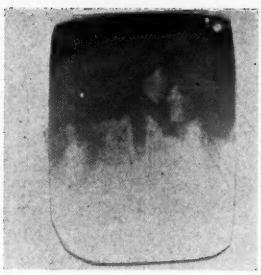

Fig. 22.

Fig. 6.—Residual area in maxillary second bicuspid area. Removing tooth did not remove the infection.

Fig. 7.—Residual area in maxillary left lateral region where infection remained after removal of tooth.

Fig. 8.—Residual area in maxillary first molar region due to chronic osteomyelitis existing after removal of tooth. This area extended into the maxillary sinus.

Fig. 9.—Residual area in right maxillary first molar region, showing result of infection remaining after removal of tooth.

Fig. 10.—Residual area in left maxillary lateral region where infection was not entirely removed before inserting bridge.

Fig. 11.—Residual area in left mandibular first bicuspid area, extending under the apex of the cuspid.

Fig. 12.—Residual area in right maxillary bicuspid region.

Fig. 13.—Residual area in left maxillary lateral region.

Fig. 14.—Residual area in left maxilla. There is a cystic area about the size of a fifty-cent piece, which involves the floor of the maxillary sinus.

Fig. 15.—Residual area in right maxillary cuspid region.

Fig. 16.—Residual area in right maxillary lateral region, showing tip of root left in the bone at the time of extraction.

Fig. 17.—Residual area in left mandibular molar area, showing root and arc of rarefying osteitis, with probe used to localize.

Fig. 18.—*A*, left maxillary first bicuspid, showing nodular tooth follicle over apex. *B*, supernumerary nodule left in bone after removal of bicuspid, and residual area shown.

Fig. 19.—Residual area of osteitis in anterior palatine foramen area. This area was detected when it became acute and patient sought relief. Gutta percha was found in the area.

Fig. 20.—Right maxillary lateral region showing gutta percha and residual osteitis, where socket failed to heal after removal of tooth.

Fig. 21.—Left maxillary first molar area showing particles of cement, and residual area where socket failed to fill in properly.

Fig. 22.—Maxillary incisor region showing loose particles of crown of tooth and root.

but when a flap is turned back and the area is explored, the bone will be found to be definitely honeycombed and there will be definite evidence of infection. One of the most important factors in oral surgical operations for the removal of teeth is a definite routine plan of preoperative and postoperative roentgenograms. Many of these residual areas can be determined by preoperative roentgenograms. In many cases while the operator has failed to detect the areas in the preoperative roentgenograms, upon a study of the postoperative result, immediately after the operation, he will detect the residual infection. It is also well to continue to check up on pathologic areas with the roentgenogram, having the patient return at stated times until the bone has regenerated. In this way residual bone areas will be eliminated.

A. *B.*

Fig. 23.—*A*, intraoral film in which high angle hides root and residual area. *B*, proper angle discloses root in left cuspid region.

TREATMENT

The treatment for residual infection is surgical. Where there is a residual infection in the soft tissues the area should be opened sufficiently for proper drainage, and where there is a circumscribed area of chronic infection, it should be properly removed. All roots left in the bone should be removed, as practically all of them will be found to be definitely infected. The only exception I would make to this rule would be where the removal of the root would be apt to cause the patient more trouble than the trouble he would be likely to have from the infection. In other words if the roentgenograms should disclose a piece of root in the maxillary sinus and all other diagnostic evidence showed that the sinus was in a healthy condition I would not recommend opening the sinus for the root. However, I would want to be sure that the sinus was healthy, and that would necessitate going into the matter seriously and thoroughly. I would want different types of roentgenograms of the sinus

and of the teeth, I would want transillumination, irrigation of the sinus through the intranasal wall, or to the normal osteum, and I would want the symptom diagnosis.

If a root were shown to be in the immediate vicinity of the mandibular canal or the mental foramen and its removal would be apt to cause a permanent injury to the nerve or a nerve disturbance, I would not want to remove it unless I felt certain that the removal of the root would cause the patient to be in a better condition than if the root were present. In removing these residual areas of infection, the same type of surgery is required as for re-

Fig. 24.—Intraoral film showing root and residual area in maxilla after patient had worn full plate for fifteen years.

moving roots in different parts of the mouth. A flap suitable for access to the area is made, and the tissues are retracted, and the bone removed immediately overlying the area with a curette or with a chisel, as may be best indicated. The pathology should be removed and the area entirely visualized so that the operator can see what he is doing. A blood clot is then encouraged by slightly stirring up the area, and the flap sutured back into place. The ordinary postoperative care is given, keeping an ice-bag to the face and having the patient rest. The patient should be instructed to return for postoperative treatment until the wound is healed properly, and the area should be kept under observation from time to time until it becomes normal.

THE ETIOLOGY OF ULCERATIVE GINGIVITIS*

By Edward C. Stafne, D.D.S.,† Rochester, Minn.

THE term ulcerative gingivitis has been used in this paper because there are several cases in the series under consideration that are of metallic and systemic origin.

Predisposing causes of ulcerative gingivitis may be divided into two groups: local and general. Local causes include those that lower the resistance of the tissues and may be the result of mechanical, bacterial, and chemical irritation. Large and ill-fitting crowns, fillings with overhanging or unfinished margins, gingival caries, and poorly adapted partial dentures tend to lower the resistance of the gingivae by mechanical irritation. The excessive formation of salivary and serumal calculus likewise produces gingivitis in the areas where deposited, and provides a field which may be susceptible to attack. The fermentation, acid formation, and the production of toxins from lack of proper care of the mouth are stressed by many observers. Reasoner and Gill stated that the presence of organisms of this disease and the disease itself vary inversely with the care given to oral hygiene. They also stated that soap solutions have a selective action on the organisms, and they recommend their use as a measure to prevent the infection.

Buehler, because of the presence of the same organisms in both conditions, has associated pyorrhea alveolaris with Vincent's infection. He did not, however, suggest any causative relationship, other than that a more progressive type of pyorrhea may result from a Vincent infection. That pyorrhea alveolaris is not a significant etiologic factor is the consensus of opinion, although when one considers the deep pocket formation and extensive lesions that are found, one might think that an ideal field had been provided for the attack of the more acute type of gingival infection. The low grade, slowly progressive chronic infection which is characteristic may, however, have built up a local immunity to the more severe types. The greatest incidence of Vincent's infection occurs in young patients, whereas pyorrhea alveolaris is distinctly a disease of older persons. It should be noted that pyorrhea is spoken of here as the condition in which there is definite pocket formation with demonstrable active suppuration.

Among the partially erupted teeth, the mandibular third molar is by far the most common offender. This tooth frequently fails to erupt fully, leaving a flap of soft tissue over the distal portion of the crown, under which invariably is found a chronic mixed infection. It is not unusual to find an intermittent subacute or acute condition in these culdesacs. The cleansing value of mastication and proper hygienic care are also more likely to be neg-

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lected because of the position. Cahn places special emphasis on partially erupted third molars as a point of lessened resistance and calls attention to their significance as the primary point of infection. The assumption during the World War that erupting third molars was one of the significant predisposing factors for the extensive incidence of infection is not without foundation. Austin has called attention to the fact that the average age of the men in the troops was the age when the eruption of third molars takes place. The age limit was narrow, therefore, the incidence of these teeth in any one group was very high. Maxillary third molars partially erupted and malposed are responsible for acute ulcerations which may result in general acute gingivitis. Unhealthy gingival conditions are often associated with irregular and malposed teeth, regardless of their position in the arch.

Trauma due to the scaling of teeth, instrumentation, brushing, and the use of dental floss, may by breaking of the epithelium provide a path of entry for the infecting organisms. Grieves in 1919 called attention to the danger of trauma in instrumentation, and Hirschfeld in a recent issue of the *Journal of the American Dental Association* stated that a patient may have all the earmarks of acute infection within twenty-four hours to thirty-six hours following the scaling of teeth. He suggests that there may be a latent, or subacute infection present, and that the trauma tends to increase the virulence of the organisms.

Another factor, which is more or less problematic, depends upon the presence or absence in the oral flora of the organisms associated with the infection. Trainor found that in certain cases in which he obtained negative smears the smears remained negative on repeated examination. It would be interesting but difficult to determine whether infection would occur in these cases.

Hirschfeld has suggested that there may be a relationship between the very large increase in the sale of cigarettes and the increased incidence of the infection. Smeltzer and other observers seem to think this is not significant if smoking is moderate. Pardee, Gordon and Riley, in a report of endemic cases observed in a large school for girls, stated the incidence was not greater among smokers than among nonsmokers.

Vincent's angina may come prior to, and be the immediate cause of, ulcerative gingivitis. The order may more often be reversed, or, so far as can be determined, the two may occur simultaneously.

General debility brought about by fatigue and exposure undoubtedly played an important part in the prevalence of the infection during the World War. One would almost expect from this observation that there would be a high incidence among the large number of generally debilitated patients in hospitals, but reports do not substantiate this. Common colds and influenza have also been mentioned as general predisposing causes. There are, of course, several specific systemic conditions which are said to be predisposing; among these are syphilis, lymphatic leucemia, diabetes, and metal poisoning. Hypertrophic gingivitis which develops in some cases of lymphatic leucemia is prone to become ulcerous and result in a more acute form of gingivitis. Kritchevsky and Séguin stated that the elimination of mercury, bismuth and lead through the gums causes necrotic lesions which allow the associated organism to invade and multiply.

O'Leary has called attention to the fact that mercurial stomatitis is more prone to develop in mouths in which gingivitis or poor hygienic conditions are present. He recommends, therefore, thorough prophylaxis and treatment, if indicated, prior to the use of mercury and insists on rigid hygienic measures while the treatment is being carried on. In this manner the incidence in these cases has been reduced to a minimum. In any of these cases, whenever stomatitis develops, the treatment must be discontinued until the condition in the mouth has cleared up. Given an unclean mouth as a predisposing factor, the chemical changes incident to mercurial stomatitis, as reported by Almkvist, seem to be as follows:

Bacterial action causes injury and desquamation of the epithelium with the production of hydrogen sulphide. When the gas is absorbed by the tissue, mercury replaces the hydrogen ion to form mercuric sulphide which is precipitated and deposited in the endothelial cells. The mercuric sulphide can be shown chemically in the capillaries where it causes inflammation which closes the lumen of the blood vessels with resulting necrosis, and the organisms are then able to attack the necrotic tissue and digest pure protein. The result is a progressive type of gingivitis or stomatitis. Bismuth also forms these precipitates, but they are much less toxic.

Rathery and Binet, in a study of the saliva of diabetic patients, found the amount was diminished and the viscosity increased. They also found that there was often an acid reaction. They did not, however, suggest any relationship to ulcerative gingivitis, although attention was called to the association of pyorrhea alveolaris and diabetes mellitus.

Many observers believe that there is a dietary deficiency factor, and the use of a prescribed diet which contains the antiscorbutic vitamine is included in the treatment, a measure which if combined with the local treatment would be rather difficult to evaluate. Careful questioning as to the patient's diet and dietary habits is to be recommended and a corrective diet with the usual treatment may be of value. It is true, however, that, in scurvy, which is definitely a dietary deficiency disease, the gums become swollen, bleed easily and frequently ulcerate. Goadby reported that an epidemic of ulcerative gingivitis which occurred in Mesopotamia during the late World War was associated with this condition.

Pellagra is a dietary deficiency disease which may be predisposing to ulcerative gingivitis, as one of the first symptoms of the disease is a sore mouth. According to McCollum and Simmonds the incidence in the United States has increased rapidly; from 1908 to 1917, 170,000 cases were recorded, most of them occurring in the southern states. As this is a protein deficiency disease, the antiscorbutic diet would be of no avail.

A review of the literature on this subject impresses one with the widely divergent views regarding the relative importance given predisposing factors. The varied conditions under which observations are made may explain to some extent these differences with regard to the probable etiology. A series of patients from an endemic group may present a far different oral picture from one that is not. The community, be it rural, industrial, urban or otherwise, may differ in many respects. The type of practice would also give one a varied opinion as to the relative significance of predisposing factors. A

practitioner who by periodic examination, prophylaxis and instruction as to the proper hygiene maintains a healthy condition of the teeth and supporting structures, would when his patients present themselves with acute gingival infections form opinions as to the probable cause, which would differ from those formed by a practitioner who has not been able to give his patients the better dental service.

The series reported here consists of fifty consecutive cases of the acute type of the infection. No case so far as could be determined was from an endemic source, although a few of the patients were living under group conditions such as are found in barracks, dormitories, and so forth. With few exceptions the general hygienic condition was well above the average. The majority of patients had received uniformly good dental service. When these patients presented themselves, a careful clinical examination of the oral cavity was made and a history taken, with the various probable causes in mind. The condition of each patient was then classified as to the predisposing cause which on examination seemed to be most apparent.

CLASSIFICATION

PROBABLE CAUSE	CASES
Extraction	1
Vincent's angina	1
Systemic	1
Malocclusion	2
Recurrence	2
Instrumentation	2
Metallic	2
Poor hygiene	3
Contact	4
Pyorrhea alveolaris	4
Partially erupted teeth	5
Poor restorations	7
Primary infection	16

The presence of what might be considered an apparent cause is, however, not positive proof that it is causative, and it is very likely that several cases in groups other than that of primary infection, rightfully should be classified with that group. A report of the general examination of all these patients was available; the majority were found to be essentially normal.

The patient whose acute gingivitis developed following extraction was seen within a week after an impacted mandibular third molar had been removed. The tooth had not been troublesome prior to its removal. There had been marked trismus and postoperative swelling for several days, and only fluids and soft foods were taken. Since the patient was deprived of the solid foods which tend to cleanse the teeth, and since the teeth could not be brushed, a large amount of food collected in and around them which resulted in a very unhygienic condition. It is also possible that the removal of a tooth may stir up a latent infection, and in this connection it is well to call attention to the danger of surgical procedures if there is any evidence of the infection present. Swabbing the mouth with a mild antiseptic solution and the use of a warm sodium chloride mouth wash should be recommended in the postoperative care of these patients.

One patient gave a history of having received treatment from a physician for Vincent's angina for about a week prior to the onset of symptoms referable to the mouth.

In the case of acute gingivitis of systemic origin the patient was suffering from lymphatic leucemia and had complained of painful gums for several days when first seen. The gingiva appeared to be inflamed and congested, and large ulcerations of the tissues in the interproximal spaces were noted. These cases generally end fatally, and only palliative treatment to check and heal the ulcerations is indicated.

Two patients had mouths with malposed and irregularly placed teeth throughout the entire dental arch. In the absence of the more acute infections, this type of mouth usually presents a chronic inflammatory gingivitis, which may be the predisposing factor. This type appears to be the most discouraging from the standpoint of treatment.

Two patients gave histories of having had previous acute attacks. Both had been treated and dismissed as cured, one of them, eighteen months, and the other six months previously. Both had several rough fillings with overhanging margins. One patient had made every effort to keep the teeth clean, and the other had neglected them. Because of the great susceptibility to recurrence every apparent source of irritation should be removed as soon as possible. Patients should be informed as to the possibility of recurrence and impressed with the greater need for proper home care, especially if a great deal of tissue has been destroyed.

Two patients gave histories of painful and bleeding gums within a week after their teeth had been cleaned. The mouths were unusually well cared for from the standpoint of professional service, and the infection came on in both cases following periodical oral prophylaxis.

The short interval between the prophylactic treatment and the apparent onset of infection is of interest. The trauma from scaling probably is the exciting cause, and laceration of tissue even though slight provides a path of entry. The possibility of passing the infection from one patient to another suggests itself. In these cases, however, both patients had been in the offices of dentists who are particularly careful about proper sterilization of instruments. It should not be out of place here to suggest the use of sodium perborate, hydrogen peroxide, or some agent as a preventive measure for several days following work of this nature.

Two patients had ulcerative gingivitis of mercurial origin, and both had been receiving treatment for syphilis. The mouth of one of them was in a deplorable condition. Many teeth were missing, others were loose, and there were several large and crudely made restorations. Both patients were well past the age of forty, and hygienic measures had been very much neglected. Such measures and factors that lower the local resistance undoubtedly play a significant part in the etiology of this particular group of cases.

Only three cases are classified in the group, in which poor hygienic measures were the most apparent factor. The statement, however, has been made that such care in the entire series was well above the average with but very few exceptions. All of these patients, as well as those with pyorrhea were

advanced in years. Two of them made no attempt to keep the mouth clean, and the other claimed to have used a tooth brush, although appearances indicated the technic to be faulty.

Four patients gave a definite history of contact. A boy, nine years old, had been one of several boys infected by marbles held in their mouths while playing with them. It was later learned that one of the boys had a sore mouth at the time. One patient, a woman, thirty years old, had been caring for a baby that had stomatitis. The remaining two patients were young married women. They both had noticed the infection a short time after their husbands had complained of painful bleeding gums.

Informing patients as to the contagious nature of the infection and the proper precautions to take, is very important. The exact mode of transmission has not been entirely agreed upon, although it is assumed that the infection is carried and spread from an infected person to a well one by direct contact. An unsuspecting person may be a carrier and transmit the organism, harmless to himself but harmful to others.

The four patients with associated pyorrhea alveolaris were all more than forty years of age and therefore well past the age of greatest incidence. None of them had mouths which could be considered clean, and the condition of all might have been classified under poor hygiene but for the evidence of active and advanced pyorrhea. Pyorrhea as a cause has been questioned; it may be that the most obscure factor was causative. The only diabetic patient in the entire series was in this group.

Five patients presented themselves with partially erupted third molars, four of which were mandibular third, and the fifth maxillary third molars. Two of the patients with mandibular third molars gave histories of having several subacute infections prior to the one which resulted in general acute gingivitis. Patients with the other partially erupted mandibular third molars did not present such a history, but the onset of general ulceration of the gingiva followed the first acute attack by a few days. There had been soreness and bleeding about the partially erupted maxillary third molar repeatedly for a period of two years, and the wisdom teeth had been sore for several days before the gums became painful and began to bleed. Clinical and roentgenologic examination did not give evidence that these teeth would eventually erupt. The lesions which occur at this site are usually more extensive and severe and do not respond to treatment as well as lesions situated further anteriorly. The treatment may also be made more difficult by the trismus which is likely to be present in this group. Following proper treatment these teeth should be removed without exception in order to prevent recurrence. Much can also be done in the way of prevention by carefully watching these molars. All third molars which have begun to come through the mucous membrane and do not show promise of erupting fully or of taking their proper place in the dental arch, should be removed.

Poor restorative work had been done in about 14 per cent of the cases. Three patients were wearing ill-fitting partial dentures. The initial lesion could be traced in each instance to irritation from a clasp attachment or some other part of the denture. Fixed bridges with full crown abutments much too

large and impinging on the soft tissue were found in two cases. The pontics had been made without consideration of hygiene and showed evidence of never having been well cleaned. The larger and more extensive necrotic ulcers in the region of these restorations indicated that the infection had started at that point. The remainder of the mouth showed evidence of fairly good care. In the remaining two cases extensive amalgam restorations had evidently been inserted in a most slipshod manner, without any attempt to build up to contour or proper contact with adjoining teeth. In one of these, several restorations contained an excess of the alloy which almost filled the interproximal spaces. It should be remembered that all poor restorations should be removed and properly replaced before the patient is dismissed.

The cases termed primary infection consist of those in which by a process of elimination none of the predisposing factors mentioned could be found. Thirty-two per cent of the cases were placed in this group, which is by far the largest in the entire series. Only cases were included in which the mouths appeared to be healthy before the onset of the infection. The absence of tartar, excessive calculus, and apparently the well-polished surfaces of the teeth suggested that the mouths had been well cared for. Cases were not included if there had been previous trouble, since there might have been recurrences. In all the mouths restorations were uniformly good; gingival caries, and partially erupted or malposed teeth were not present.

In the consideration of infection, two factors must be kept in mind, as it is on these that the absence or presence of infection depends, namely, the local and general resistance of the host, and the virulence of the infecting organism. If the resistance of a certain part is lowered to a point where it is unable to ward off the attack of the invading organism, infection will result. That part need not necessarily be below normal; contact or exposure to the infecting organism is all that is necessary for an active infection, although it is reasonable to assume that lowered resistance makes invasion easier. In other words, infection results when the organisms have gained a foothold and begun to multiply, after having gained entrance to the tissue through a medium which has been particularly adapted to their respective cultural requirements.

There are organisms which, while ordinarily nonpathogenic, may become virulent, and given a proper field for invasion may produce very active infection. The "spirochete" and the fusiformis dentium, because they are numerous in mouths in which there is no evidence of infection, must be considered relatively inactive when found in what might be called their normal habitat. These organisms undoubtedly become virulent and invade directly, or some other organism or condition prepares a suitable field for the invasion and building up of virulency. There can also be no doubt as to the association of these organisms and other necrotic and gangrenous lesions in the mouth and elsewhere. That these organisms are secondary invaders and that the field of entry is prepared for them by other organisms seems to be the generally accepted view. In the absence of lesions and predisposing causes mentioned, what is then responsible for the onset?

The oral flora is most prolific, and with the large variety of organisms present it is difficult to establish proof as to any one being causative. Rose-

now has suggested the symbiosis of streptococci and fusiform bacilli as being responsible for the initial destruction of tissue, although the streptococcus may be the primary invader. When one keeps in mind some of the more acute types of the infection which are accompanied with a rise in temperature, enlarged cervical lymph nodes and marked leucocytosis at onset, one realizes that the suggestion carries considerable weight, because of symptoms so nearly like an acute streptococcal infection.

Davis and Pilot who have made extensive bacteriologic studies of lesions associated with the fusiform bacillus and Vincent's spirochete, in the digestive tract and elsewhere, concluded that predisposing factors are usually of first importance in determining the development of these organisms, and state that streptococci are always associated with them in the mouth and tonsils.

Davis injected guinea pigs, rats and young rabbits, intraperitoneally, intravenously, and subcutaneously, with large doses of pure cultures of bacilli. None of these injections caused lesions. When pure cultures of cocci were injected with pure cultures of bacilli, large abscesses resulted from which both the organisms were recovered. He concluded from his experiments that a symbiotic relationship probably exists between the cocci and the bacilli, and that by themselves these bacilli seem to be nonpathogenic. Noguchi has been unable to prove the pathogenicity of spirochete in the mouth by the inoculation of pure cultures, so one might almost be led to believe, from the experimental work and the known characteristics of the organisms mentioned, that the streptococcus is the one organism which is known to be capable of invading and preparing the field for secondary invaders.

COMMENT

Definite conclusions cannot be made from the observations on a small series of cases such as is reported here; however, the large percentage of cases in which the mouths are clean and the patients apparently in good general condition, substantiates the view that unclean mouths and general debility are not necessarily predisposing factors.

Much will have been done toward prevention when by proper education and capable dental service the mouth has been kept clean and healthy. Capable dental service must necessarily include the recognition and removal of factors which are predisposing to infection.

Musburger reported that answers to a questionnaire sent to dentists in various sections of the country indicate that there is an increased prevalence of such infection. He also stated that the incidence was apparently increasing in his own community. A systematic plan of examination, accurate study, and recording of all conditions found in such cases is of great value for more reasons than one. One who uses a definite systematic plan of examination soon develops a keener sense of observation and is less likely to overlook and leave unrecorded conditions which should have been noted. Tabulated reports on the basis of accumulated records may later prove to be of value from the standpoint of both cause and prevention.

Much is to be learned as to the rôle various microorganisms play in the etiology of the infection, and until it has been produced in susceptible animals

from one or more organisms obtained from the lesions, the question of etiology must remain a matter for further investigation.

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DEPARTMENT OF
DENTAL AND ORAL RADIOGRAPHY

Edited By
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and Howard R. Raper, D.D.S., F.A.C.D.

EXTRAORAL RADIODONTIC EXAMINATIONS

By Dr. Clarence O. Simpson, St. Louis, Mo.

(Continued from October issue.)

THE only special accessories needed for extraoral examinations are a cassette with intensifying screens and trays for development of the films. Cardboard exposure holders can be used, but since they do not provide sufficient pressure for screen contact, cassettes with intensifying screens are essential for short exposures. The advantages of reducing the exposure time by the means of intensifying screens are less risk of movement and the possibilities in greater target-film distances. Although extraoral examinations can be made with 5×7 films, they offer scant latitude in registering an area large enough to meet the requirements. The use of 8×10 cassettes and films is preferable because a larger field of observation is covered to eliminate errors of omission, and less accuracy is demanded in placing the cassette to reduce errors of commission. Unless a tank is already in service, the occasional development of 8×10 films is accomplished better in trays than in tanks. A small quantity of fresh developer can quickly be brought to the correct temperature for use, and the progress of development can be observed without removing the films from the solution. Fresh solution, correct temperature, and inspection contribute to the production of uniformly superior negatives.

The operative technic for extraoral examinations is rendered easier and more accurate by maintaining all details constant excepting the rotation of the head and the exposure. This method is practicable for all views except those of the incisor regions. The constant factors are the position of the cassette, the vertical pose of the head, and the direction of the rays, which greatly simplify the operations. After lowering or removing the arms, a dental chair is most suitable for the examinations. By having the patient turn so the feet are at the side of the chair, the headrest can be adjusted to support the cassette, and the poses can be secured without inconvenience or discomfort.

Fig. 7.—A view of the angle of the mandible to reveal a misplaced third molar and a follicular cyst. The condyle, the lower portion of the ramus, and the body of the mandible in the molar region are included in the view. The unerupted cuspid at the lower border of the mandible is incidentally shown, for had the examination been made for this region the superimposition of the cervical vertebrae would have obscured the third molar. The unerupted maxillary third molar on the opposite side is projected into the orbit, which is sometimes misinterpreted as a gross misplacement of the tooth.

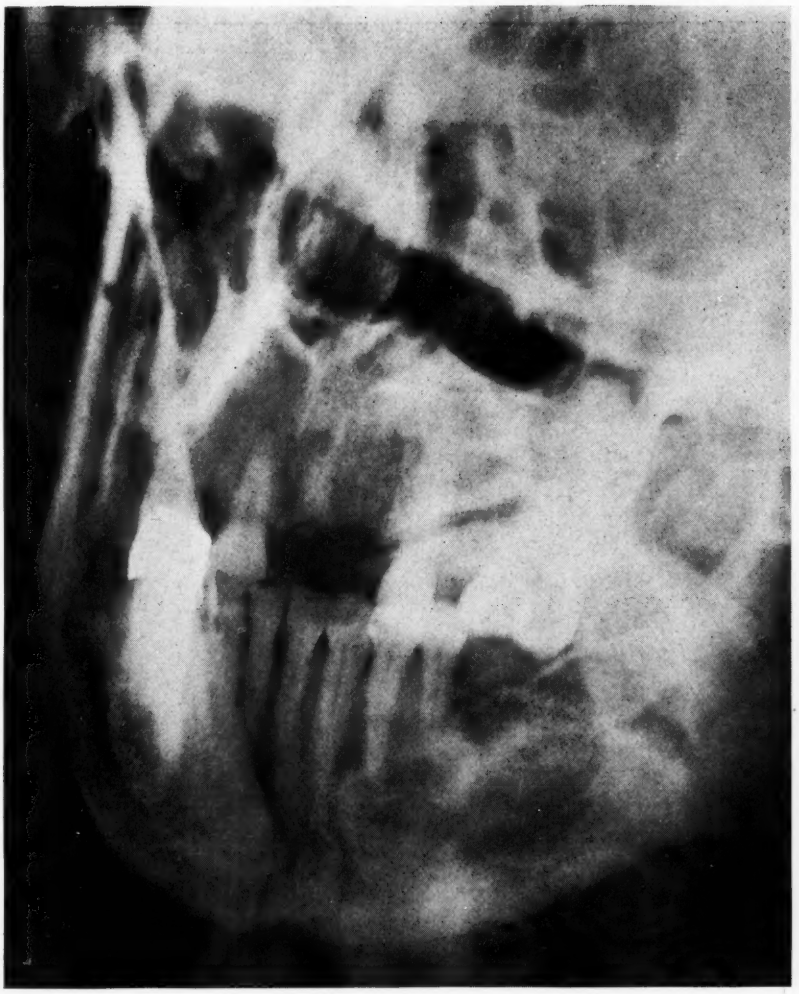

Fig. 8.—An extraoral view of the incisor region which is not generally considered possible. The unobstructed view is limited to the region from the first bicuspid to the opposite lateral incisor, and by reversing the position a corresponding view is shown of the opposite incisor region. This examination was made to reveal the fracture of the mandible near the symphysis. When a fracture is discovered in the body of the mandible, the rami and condyloid processes should be examined because of the frequency of coincidental injuries in these regions. This patient received a blow on the ramus producing the fracture at the symphysis and at the base of the condyloid process as shown in Fig. 9.

Fig. 9.—A view of the ramus and condyloid process revealing a complete fracture at the base of the condyloid process and two partial fractures of the ramus, and excluding fracture of the zygomatic process. This is the same patient as shown in Fig. 8, but there is no evidence in this view of the fracture near the symphysis which demonstrates the necessity of regional examinations in suspected fracture.

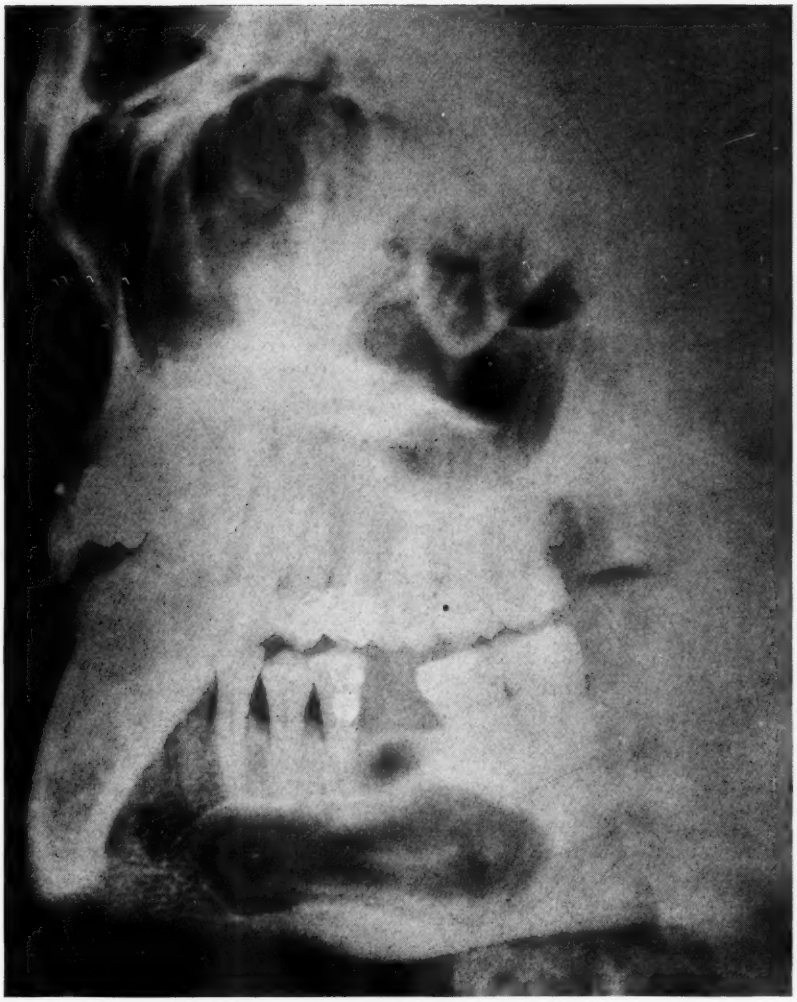

Fig. 10.—An extraoral examination of the bicuspid and molar region revealing an extensive cyst in the mandible. To include all of the cyst in an unobstructed view, the pose must be precisely adjusted. This can be accomplished by making an exposure with a measurement of the distance between the pronasion and the cassette; then if a correction in the pose is necessary, it can be made by changing the relation of the nose and cassette and maintaining the other factors constant. The advantages of this technic over guessing at the poses by unsystematic methods are evident.

Fig. 11.—An examination to reveal the head of the condyle. This is one of the few indications for having the teeth out of centric occlusion in extraoral examinations. By opening the mouth to the limit of extension the condyle is carried out of the glenoid fossa for inspection. In this pose, the neck must be extremely flexed backward to avoid the images of cervical vertebrae.

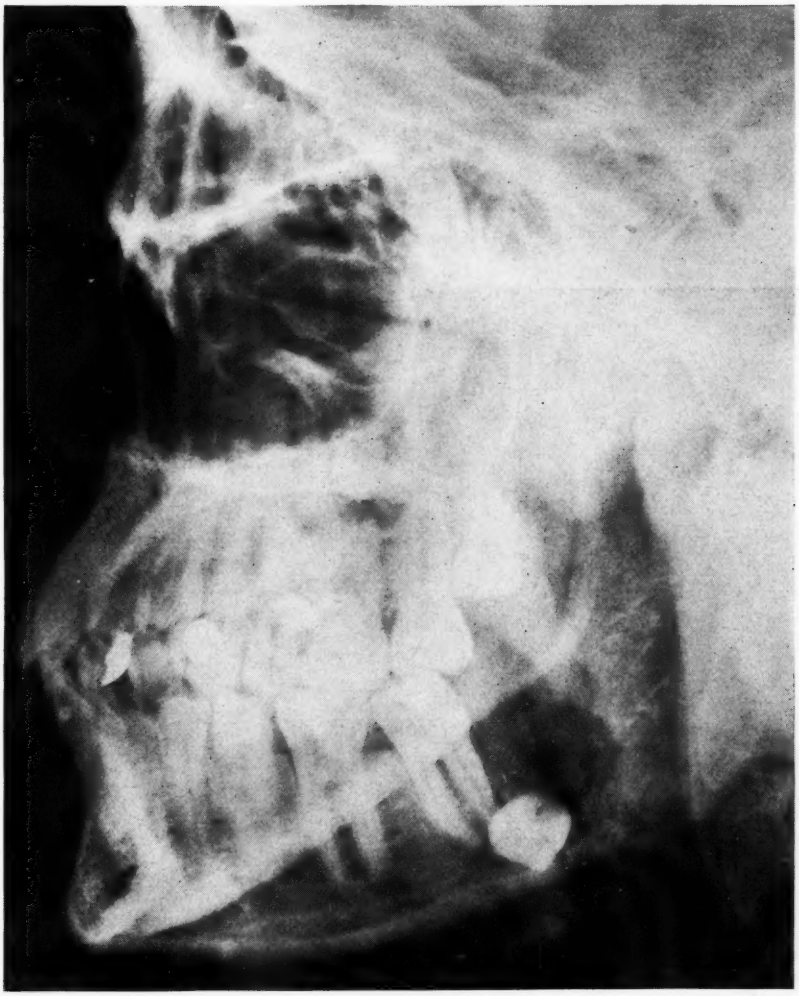

Fig. 12.—A modified view of the mandibular molar region. The examination was for localization of a partially developed third molar which was lost during an attempt to remove it. Since the investigation was of the mandibular and submaxillary regions and not the maxillary region the verticohorizontal angle was changed from the usual 25 degrees to 10 degrees below horizontal. This modification gives a more accurate superoinferior localization of objects out of the alveolar process and is indicated for an extraoral view of calculus in the submaxillary gland. The displaced third molar is located opposite the apex of the distal root of the second molar, and the traumatic destruction of the mandible and a fracture through the lower border are revealed. An occlusal view is required for buccolingual localization.

Fig. 13.—An occlusal view of the displaced third molar shown in Fig. 12. The third molar is located in the soft tissues at the lingual side of the mandible. The fracture with slight displacement of the fragments is more clearly revealed than in the extraoral view.

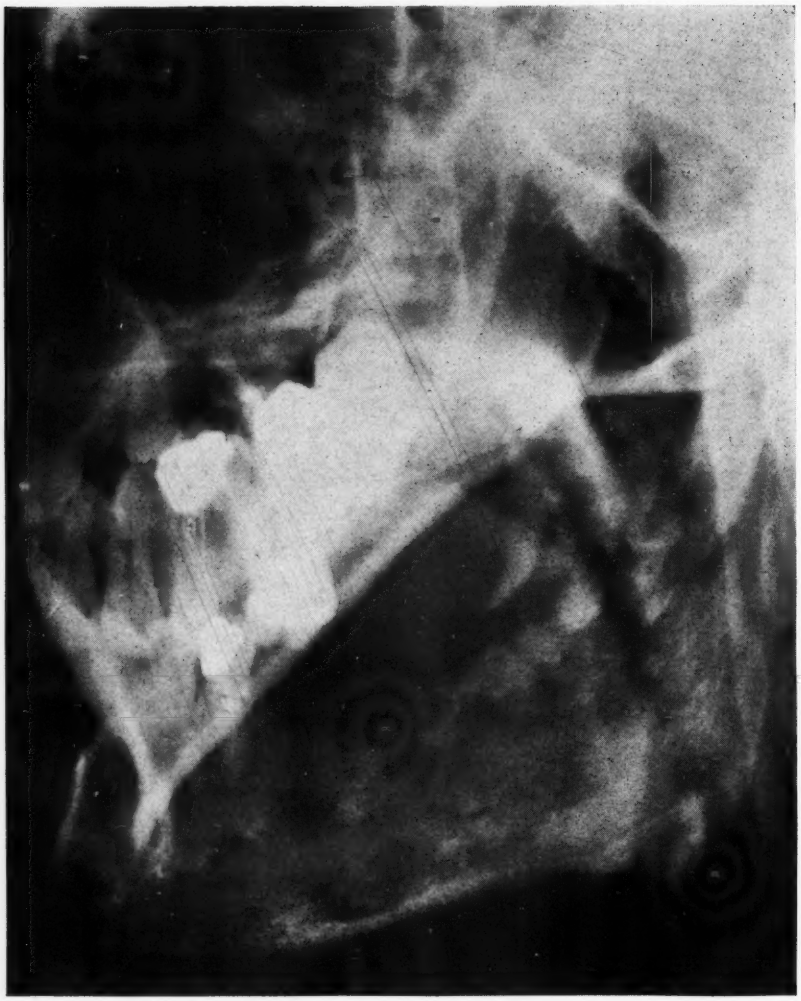

Fig. 14.—A modified extraoral view of a necrotic mandible. Since the desire was to inspect as much of the mandible as possible without consideration of the maxillary region, the face was not turned close toward the cassette to reveal the maxillary molar region. This pose discloses the mandible from the bicuspid region almost to the posterior border of the ramus but leaves the condition of the condyloid process undetermined.

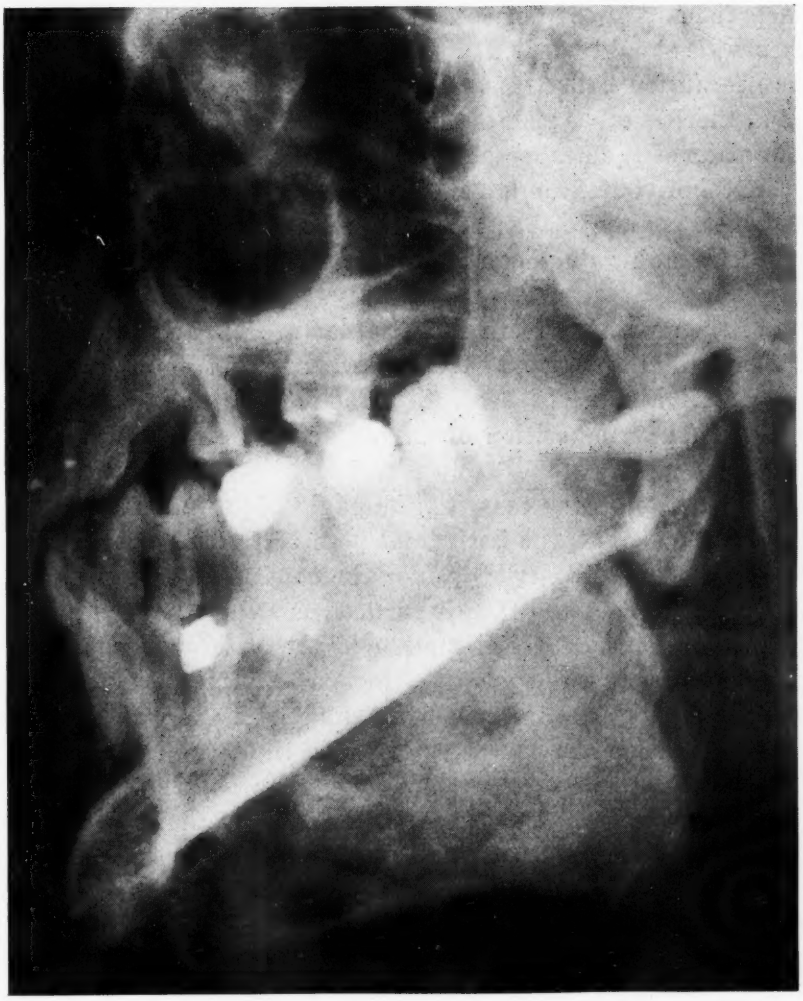

Fig. 15.—Another view of the necrotic mandible shown in Fig. 14. With the sagittal plane parallel with the anteroposterior plane of the cassette, the body of the mandible is partially obscured, but a pathologic fracture of the condyloid process is clearly revealed.

The patient, seated sidewise in the chair, should be instructed to incline the body forward and recline the head to the limit of flexibility. With the teeth in centric occlusion, the bending of the neck backward minimizes the superimposition of the cervical vertebrae upon the mandible, and the forward inclination of the body places the mandible in an approximately horizontal position. The cassette should be inclined about ten degrees toward the neck to reduce the distance between it and the mandible, and rested on the shoulder and against the headrest to retain it in position. Additional support of the cassette is secured by it being held at the lower front corner with the nearer hand of the patient. To promote immobility, a gauze bandage three inches wide should be tightly bound around the head, cassette and headrest. This precaution is necessary because the face is only rested against the cassette, and there is more risk of the head moving than when it is supported between the pads of the headrest for intraoral examinations.

The verticohorizontal angle of projection to carry the image of the opposite side of the face above that being examined is twenty-five degrees below horizontal. This angle does not materially distort the images of the region under examination because it only slightly overcompensates for the buccal inclination of the maxillary teeth and alveolar process and the lingual inclination of the mandibular teeth and alveolar process from the sagittal plane. The anteroposterior angle of projection should be perpendicular to the cassette to prevent superimposition of the adjacent teeth and distortion of the images.

With the position of the cassette, the angle of projection, and the vertical pose of the head constant, the horizontal pose of the head for examination of different regions may be described. For the condyloid process and the posterior border of the ramus, the face is turned very slightly toward the cassette from a parallelity of the sagittal plane and the anteroposterior plane of the cassette. For the ramus, the face is turned a trifle nearer the cassette. For the molar regions, the face is turned toward the cassette until the tip of the nose is about an inch from the cassette. For the cuspid region, the head is rotated so that the tip of the nose is in contact with the cassette. In these poses care must be exercised to maintain the sagittal plane in a vertical position. The exact horizontal pose of the head for examination of each region cannot be predetermined because of anatomic variations, especially that of the nose. However, the poses can be duplicated or corrected by measuring the distance of the pronasion from the cassette with a rule or the index finger. It must be realized that the unobstructed view in each region averages only about two and one-half inches in extent, and as the face is turned toward the cassette to project the opposite side of the mandible forward, the cervical vertebrae will be superimposed upon more of the ramus or molar regions.

(To be concluded.)

ABSTRACT OF
CURRENT LITERATURE

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA
DENTAL RADIOGRAPHY
By Dr. Edward Preble, New York City

NUTRITION AND PEDIATRICS
By Samuel Adams Cohen, M.D., New York City

It is the purpose of this Journal to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Orthodontia, Oral Surgery, Surgical Orthodontia and Dental Radiography

Late Buccal Syphilis. S. S. Greenbaum (Philadelphia). The Dental Cosmos, **71**: 9, 1929.

The author is not a dentist and his paper was not read to dentists, but it is well suited to them because of a large number of photographs of actual patients. Naturally the latter show usually only lesions of the tongue and lips, but other localities may sometimes be brought into view. Still the greater part of buccal lesions occur on the tongue, lips and palate. One of the photographs shows a large gumma of the right anterior pillar of the fauces extending to the soft palate, while another represents a gumma of the hard and soft palate. Syphilitic lesions of the mouth when late comprise gummatous tumors which may be multiple and resemble other submucous growths except that they may be absorbed spontaneously or as a result of treatment. These growths may ulcerate and perforate, and the ulcers may heal with scar formation. Recognition is difficult without serodiagnosis, but syphilis may be suggested by the presence of other lesions on the skin. Gummata which do not ulcerate may undergo fibrotic change, and in some cases there may be atrophy of the tongue. Leucoplakia is, of course, well known to the dentist and is syphilitic in over half the cases. There are numerous clinical forms, and the author gives photographs of the warty variety. These lesions do not, of course, respond to antisyphilitic treatment, although the patient should be put under its influence because it may prevent the formation of new lesions. The likelihood of cancerous degeneration is, of course, an unrelated subject, for any chronic lesion of the mouth may give origin to cancer. In conclusion the author urges that both the Wassermann and the Kahn tests be used in diagnosis, for in undoubted late syphilis of the mouth many cases have reacted negatively to the former. Several photographs are given of affections readily confused with buccal syphilis as lichen planus and nonsyphilitic atrophy of the tongue.

Significance of Blood Counts in Periodontoclasia. W. Claude Adams (Portland, Oregon). J. Am. Dent. A. **16**: 9, 1929.

The author began the study of this subject in 1927, using as a basis cases from his own dental practice representing chronic oral infections, many of which were cases of pyorrhea, with red, white and differential counts taken before and after treatment. In many instances infections were present elsewhere in the body which naturally hampered the diagnosis. He found, however, that if collateral infections are absent removal of the cause of oral infection will be followed by an improved condition of the blood in nearly all cases. Not all types of blood count show this improvement, but more than three-fourths show improvement in three out of six possibilities, and but ten cases showed improvement in all six. The six comprise hemoglobin, red cell, white cell, polymorphonuclear, large and small lymphocyte. In about three-fourths of all cases there is a distinct parallelism between blood counts and clinical symptoms. The author submits four of the ten cases which showed improvement in all six counts. In these cases the clinical improvement was striking. One case may be cited here. A man of 50 years with chronic valvular heart disease and high blood pressure was confined to bed with symptoms suggesting gall bladder inflammation. He was treated for pyorrhea with removal of four badly infected teeth, and the left antrum was opened and drained. Evidences of cholecystitis vanished, and the patient formerly refused insurance was pronounced insurable. The six counts taken before and after treatment show great improvement.

Diagnosis of Oral Syphilis. Abraham Stone (New York). Am. Dent. Surgeon **69**: 9, 1929.

This paper was read before the American Society of Stomatologists last May. The author is apparently a syphilographer, as he mentions treating patients with various extragenital primary lesions. He describes at length chancre of the lip, and if there is any doubt about its nature, one had better examine the scrapings of the lesion with the ultramicroscope, dark-field illumination, although the presence of other spirochetes in the patient's mouth may prove a source of confusion. Thus the presence of the spirocheta microdentium once led to a false diagnosis of a chancre, the true lesion having been an epithelioma. In such a questionable case the author would puncture and aspirate the adjacent swollen lymph node and examine for the spirocheta pallida. A description of the mucous patch contains nothing new, and he passes on to early and late tertiary lesions. In necrosis of the bone of the hard palate he would not attempt to remove the dead bone until after an intensive treatment with salvarsan, etc. He passes briefly over leucoplakia to the buccal lesions of hereditary syphilis. Hutchinson's teeth and other anomalies of dental development due to the disease are considered, and the author next takes up the buccal lesions due to mercurial treatment, and in a lesser degree to the recent employment of bismuth. In these forms of stomatitis the dentist is of great value both in preventing and in curing the stomatitis, for

clean teeth antagonize to some extent the development of the latter. The author commends highly the use of serodiagnosis in syphilis of the mouth but lays down no rules of procedure for doubtful cases.

Metaphen in Preventive Dentistry. G. K. Thomson, W. G. Lawson, and R. P. Smith (Halifax). J. Am. Dent. A. **16**: 10, 1929.

In February, 1928, the authors began a course of experiments in patients from 7 to 10 years of age resident in charitable institutions and hence easy to follow up for end-results. The work was carried out by the undergraduate students, one patient to each student. Prophylactic treatment, including extractions and fillings, was carried out and metaphen used before and after treatment. The method agreed closely with that of Dr. Bunting save that weekly sessions were substituted for daily ones. The drug metaphen, an organic mercurial, was used in a concentration of 1 to 500 and was found to be especially efficacious against bacteria and in particular the bacillus acidophilus. The observation period has, of course, been too brief for publishing end-results, but the work has progressed very satisfactorily. Apparently weekly sessions accomplish all that can accrue from daily sessions. Children insensitive to caries naturally show a very scanty growth of the bacillus acidophilus, while those with caries show an abundance, which, however, is much diminished by treatment and the use of metaphen as a mouth wash. In certain cases the bacillus disappears and even stays away indefinitely. Treatment of this kind cannot begin until after the age of four years. In private practice the treatment has also been carried out but meets with some difficulties. Metaphen discolors the teeth unless used in extreme dilution (1:5000) which may be too weak for the necessary bactericidal effect. It is not used alone in Vincent's disease and periodontoclasia, for the authors add neoarsphenamine to the solution. It is hoped that metaphen mouth wash will cooperate especially with prophylactic odontectomy (Hyatt) as a preventive of caries.

Blood Tests in Dental Practice. I. A. Epstein (St. Paul). J. Am. Dent. A. **16**: 10, 1929.

The author approaches the problem by stating the importance of a blood count inclusive of hemoglobin determination in cases of bleeding gums, especially if there is no obvious cause at hand. Such patients may suffer from some form of leucemia, scurvy, purpura, hemophilia, etc. Some leucemic patients consult the dentist first because of the hemorrhage which forms clots in the gingival grooves and interdental spaces. Often an objective lesion is present in the swollen and ulcerated gums which results from actual leucemic stomatitis and submucous infiltration. This condition is mostly confused with Vincent's stomatitis or secondary syphilis. To add to the confusion the organisms of Vincent's symbiosis may actually be present; in fact a true Vincent's stomatitis may be grafted on the leucemic state, but the former does not yield to the usual treatment. Our diagnostic resource here is the blood count, although there are cases in which the differential white cell count is normal. In purpura the diagnosis is usually made by finding purpuric spots elsewhere than in the gums, but exceptionally they may fail in other localities. The

blood count may be able to differentiate between purpuric hemorrhages and the hemorrhagic diathesis and also by differences in the time and mode of blood clotting. It is evident that ordinary simple white and red cell counts are insufficient for the refinements of blood diagnosis, for it is necessary to take complete cognizance of the cell shape, blood color, presence of nuclei—everything implied by the term qualitative cell count as well as coagulation time, blood sedimentation time, etc.

Visit of American Dentists to England. Editorial in Dent. Surgeon, Aug. 10, 1929.

The annual session of the American Dental Society of Europe is the subject of editorial comment, notably with reference to the differences between British and American practice. The papers which attracted the greatest attention were those of Geo. B. Winter of St. Louis, Boyd S. Gardner of the Mayo Clinic, R. Volland of Iowa City, and A. D. Black of Chicago. Winter gave an illustrated lecture on his methods of exodontia, including impacted wisdom teeth. While his dexterity was much admired, it was felt that not every dentist can hope to emulate him. Gardner went at great length into the theory and practice of the Mayo Clinic on focal infection, a subject originated by English dentists but not carried out to its extreme conclusions. For that matter, the Mayo Clinic represents only a one-sided view, for some of the Americans, like Conzett of Dubuque, are equally insistent in teaching that proper root canal treatment and filling can solve the problem of dental infection. The viewpoints on bridgework and crowns are changing in both countries—less bridgework, all porcelain crowns of living teeth, gold inlays, etc. Dr. Volland gave interesting demonstrations of gold inlays. In all work of this kind the individual skill of the operator is of course the major factor in success. Arthur Black devoted himself to pyorrhea, but it cannot be said that there is any consensus of opinion on the nature and treatment of this affection, and the author showed some pessimism. The editor in admitting that the British can learn much from the Americans states candidly that the reverse should be equally true. Perhaps exchange professors can accomplish something in this direction.

Inflammation of the Salivary Glands Following Extraction. W. Möller (Cassel), Zahnaerztliche Rundschau **38**: 32, 1929.

In the rather rare cases when a salivary gland inflames after an extraction, the parotid is the one usually involved, and it is very rare indeed for the submaxillary or sublingual to participate, few cases being on record in literature. The author therefore reports his case of sublingual infection, the presumption in these cases being that the extracetd tooth is badly infected and that as a result of exodontia the microorganisms penetrate into the duct of the gland involved. The tooth removed in the author's case was a second mandibular premolar, the right side of which was badly necrotic. Attached to each root was a granuloma the size of a pea. During extraction a piece of the mesial root broke off in the alveolus and had to be excised secondarily. An anti-

septic mouth wash and the ultraviolet lamp were used in the after treatment. Next day the socket was in good condition, but several days later the whole segment of the mandible was painful and the mouth very dry. Digital examination showed a probable engorgement of the right sublingual gland which was both hard and extremely sensitive. A little turbid saliva could be milked from the duct, and the extraction wound was now the seat of a deposit. Temperature was elevated. Salivary calculus could be excluded. All antiphlogistic treatment proved of no value, and the gland was incised with escape of pus, the alveolus also discharging pus. No bacteriologic examination is mentioned. The swelling finally went down, either spontaneously or through application of the lamp.

Nutrition and Pediatrics

Are the Filipinos Undernourished? I. Concepion, J. Philippine Islands M. A. **9**: 2, 1929.

In a controversial article in reply to A. B. M. Sison's opinions on nutrition of the Filipinos, the writer reiterates some of his views on this timely subject. Concepion states that the great masses of Filipinos are undernourished, and that this claim is not made by comparing the Filipinos with any foreign standard.

These people subsist on a diet which is not only low in fat but also deficient in vitamines and mineral salts, particularly calcium. This inadequacy in the diet is manifested by an excessive infant mortality, the high incidence of beriberi both in children and in adults, the high morbidity and mortality from tuberculosis and the short expectation of life. The low weight-height rate of the population is exemplified by the university students.

There is also a high incidence of dental caries. The writer quotes from the report of L. R. Sullivan of the American Museum of Natural History and of H. G. Chappel, who, after an examination of prehistoric Hawaiian skulls, states that nearly all of those belonging to individuals of sixty years of age show gingival caries of the teeth. This was also found in persons buried before 1778—before contact with the whites. The principal food of the Hawaiians was poi, which is low in calcium and phosphorus, and Sullivan and Chappel attribute the faulty teeth to its excessive use.

With reference to improving the nutrition and growth of the Filipinos, Concepion quotes Hrdlicka, who found that the stature of Americans has shown a tendency to increase in recent years notwithstanding the immigration of shorter Europeans. This improvement is attributed by Hrdlicka to a more favorable change of environment and ample nourishment. Similarly, the Japanese have shown a remarkable improvement in their physique in recent years. Moreover, the stature of the Japanese born and raised in California is much greater than that of their cousins living in their native country.

These facts and other facts are generally accepted by the leading authorities on nutrition, that while the maximum possible development, physical or mental, of a human being is determined by heredity, the actual attainment depends upon the environment. Food, or in a broad sense diet, is one of the

chief factors if not the most important of environment. In this respect Concepion is full in accord with McCollum, that in matters of health we should adopt not the average but the optimal as the ideal. The best is none too good for us.

Status Lymphaticus. Henry M. Ray, Ann. Int. Med. **2**: 9, 1929.

Ray brings out some practical considerations of status lymphaticus. The actual cause of death in status lymphaticus is not clear. In the sudden so-called thymic deaths of infants there is a reminder of the pathology found in the experimental anaphylactic deaths of animals. In other cases the author is of the opinion that pressure symptoms of the thymus are responsible for the fatal condition. He also feels that in adult subjects the majority of deaths are due to a collapse of the inherently weak cardiovascular system.

Experimental work on status lymphaticus establishes the close relationship between the thymus and the adrenals. Many observers have noted that suprarenalectomy in animals produces a greater lowering of resistance than any other known experimental procedure. In rabbits and rats removal of the suprarenals is followed by rapid degeneration and hyperplasia of the thymus and lymphoblastic tissues.

Taking up the growth of the thymus glands, the writer makes some pertinent remarks. He feels that the thymus cells are lymphocytes and that the gland is a lymphoblastic structure which increases rapidly in weight up to the beginning of the third year, remaining stationary until the seventh year when it increases slightly, and declines about the eleventh year. At the age of puberty the glands begin to undergo atrophy. There is evidence to show that the thymus gland begins its permanent involution with sexual maturity.

According to Ray, the pathologic picture of active status lymphaticus is a definite one. Besides the enlarged thymus there is usually an enlarged spleen and a hyperplasia of the following: lingual tonsils, faucial tonsils, nasopharyngeal tissue, intrathoracic nodes, abdominal nodes and Pyer's patches, and the solitary lymph nodes of the intestines. Moreover, the thyroid and the suprarenal bodies are apt to be enlarged. He also states that the cardiovascular system is underdeveloped, the vessels being narrow and the walls thin and delicate.

Clinically, the children are well nourished and gracefully formed, having hair which is fine and silky. Their skin is marble-like and velvety. The blood coagulation time is prolonged, and there is usually an increase of lymphocytes present in the blood. In his series of cases, the author always found the lingual tonsils hypertrophied. These children mature slowly and secondary sex characteristics are delayed. They tire easily and have repeated infections.

A Study of the Effect of Various Agents, Chiefly Sunlight, Upon the Susceptibility of Rachitic Rats to Infection. Elizabeth Chant Robertson. Am. J. Hyg. **9**: 75, 1929.

Before reporting the results of her own experiments the author reviews some of the literature on this important subject. Numerous investigations

have shown that animals lacking in vitamine A are more liable to develop an infection or disease than control animals.

Block, observing Danish infants lacking vitamine A, found them to have an increased susceptibility to respiratory infection or urinary infection with B. coli. McCollum from his study of children in Vienna noticed that rachitic children receiving cod liver oil had a much lower incidence of respiratory and other infections than similar untreated children.

Regarding human beings and the relation of quartz lamp and carbon arc light to immunity, the observation is made that short radiations at weekly intervals have a beneficial effect, whereas longer and more frequent exposures are harmful.

In addition animal experiments seem to bear out the fact that so far as resistance to disease is concerned, unaltered sunlight is much superior to the radiations of a mercury vapor lamp.

Observing from her own experiments, this investigator states that rachitic rats exposed daily to the sun for two hours have an increased resistance to infection when compared with control rats kept indoors. The writer feels that the increased resistance of these animals is due to their treatment of rachitis.

The Value of Different Types of Glass for Transmitting Ultraviolet Light. Edwin T. Wyman and associates. Am. J. Dis. Child. **37**: 473, 1929.

Wyman and his collaborators report on their interesting study of the effects of ultraviolet light particularly on rickets. In a carefully controlled series of experiments, using albino rats, these investigators have advanced our knowledge of the value of different types of glass for transmitting ultraviolet light. The glasses selected for this study were window glass, Corex glass and Vitaglass "Cathedral." All told there were five groups of animals used in these experiments, classified as (1) controls, (2) window, (3) Corning, (4) Vitaglass, (5) direct irradiation. For the last class a Cooper-Hewitt Uvarc lamp was used as a source of ultraviolet light.

As a result of their five weeks of study these Boston investigators state that practically as much ultraviolet light passes through Corning glass as is obtained by direct irradiation. On the other hand, Vitaglass allows for the passage of only a certain fraction of necessary ultraviolet rays. They emphasize also that ordinary window glass is practically useless in this respect, owing to the fact that the animals irradiated under this type of glass show practically as marked a degree of rickets as those which did not receive any irradiation.

The conclusion of this elaborate study was drawn from observation of the animals' growth curves, the calcium and phosphorus content of their blood serum, the roentgenogram, and the ash contents of their bones.

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EDITORIALS

School Cooperation

ANYONE engaged in the practice of orthodontia has often met with difficulties in having children excused from school for the purpose of receiving orthodontic treatment. This undoubtedly is due to the fact that school authorities fail to realize that malocclusion is just as much of a deformity as cross-eyes, crooked feet and spinal curvature.

Certain states have laws that provide for treatment of crippled children. If the parents are financially unable to have their children treated, the state pays for the treatment. A bad malocclusion is just as much of a handicap to the youngster as is a club foot. In fact, it is more so because a deformed face is ridiculed, while a deformed leg is pitied. We have known children with facial deformities who have resented and objected going to school because

other children in school made fun of them. We have known adults with facial deformities who could not live down a certain stigma regardless of how intelligent or intellectual they were.

We believe that correction of malocclusion should receive the same attention from the state as does correction of other bodily deformities. We believe that a child is entitled to go through life with the face he inherits, but the majority of children are forced to go through life with false faces. We see many people on the street, in the subway, at the theater, who have faces that do not belong to them.

The improper development of the face is the result of incorrect use of the muscles of the mouth and mouth breathing. If malocclusion were corrected in time, proper function of the muscles would be resumed or established. Neglect of the extreme cases would be avoided if school authorities and health departments of cities and states recognized the handicap of a person with a deformed face. The treatment of facial deformity could be made much easier if proper cooperation could be obtained from school and other institutional authorities. It is much more important to have the child's deformed face corrected than to give him any set amount of schooling.

Because of existing conditions, Dr. James David McCoy presented the following resolutions at the Estes Park meeting of the American Society of Orthodontists:

"WHEREAS, the correction of dental abnormalities in children is essential to their health and well-being, and the need for such care is very apparent among the children of our schools; and

"WHEREAS, school authorities in many cities maintain free dental clinics to care for the children of the poor who require such services and have the full cooperation of school principals and school-teachers to the end that such children are sent during school hours for such care without loss of school attendance; and

"WHEREAS, the children of taxpayers who patronize private dentists and thereby relieve the schools of the expense incidental to such care are not given the same degree of cooperation from school authorities in meeting this health problem; and

"WHEREAS, children who have spent the entire day in school are unfit subjects for difficult or protracted dental operations, nor can such operations be properly and efficiently done under these conditions; and

"WHEREAS, the prerogative of parents to keep children out of school for such important and necessary care frequently leads to friction with teachers; therefore be it

"*Resolved:* That the American Society of Orthodontists does urgently request all agencies interested in child welfare to give consideration to this problem and use their influence to the end that the children of taxpayers may have the cooperation of school authorities in meeting this important health problem; and be it further

"*Resolved:* That this resolution shall be spread upon our minutes and copies sent to the leading medical and dental journals and their publication requested."

We believe it would be wise for those who are interested in this matter to bring the above resolution before mothers' clubs and other organizations interested in child welfare and also before school authorities. The average orthodontist does not require the child to be absent from school for a long period. It is only during the time that the appliance is being made that the child is asked to be away from school; after that the orthodontist can make such arrangements as to require little of the child's time from school.

We hope the time will come when school authorities will realize that education is a small asset to a person with a deformed face.

ORTHODONTIC NEWS AND NOTES

Greater New York December Meeting for Better Dentistry

The First and Second District Dental Societies will continue the series of meetings which were formerly conducted by the First District Dental Society and widely known as the "December Meeting for Better Dentistry."

The meeting this year which is the Fifth Annual Meeting will therefore be conducted jointly by the two societies at the Hotel Pennsylvania, December 9-13, 1929.

Among the essayists and clinicians who have accepted invitations to be present are: Doctors Wallace Seccombe, Toronto; J. R. Blayney, Chicago; Chalmers J. Lyons, Ann Arbor: Charles A. Lane, Detroit; Albert L. LeGro, Detroit; Dayton D. Campbell, Kansas City; James M. Prime. Omaha; Hugh W. MacMillan, Cincinnati; P. Kyprie, Detroit; John B. LaDue, Chicago; and Theodore W. Maves, Cleveland.

The meeting will be continued on the same plan as previous meetings, namely, $5.00 admits members to all lectures, clinics, etc.

A subscription blank and list of clinics will be ready for circulation November 1.

There will be a manufacturers' exhibit in the hotel during the meeting.

JOHN T. HANKS, Chairman.

Dental Society of the State of New York

The Dental Society of the State of New York will hold its Sixty-second Annual Meeting May 13, 14, 15, and 16, 1930, at Hotel Commodore, New York City.

A cordial invitation is extended to all ethical dentists, residents in the United States and Canada. Exhibitors desiring space please address Dr. T. C. Swift, 1 Park Avenue, Mt. Vernon, New York. Please apply early for information and space.

The usual preliminary program will be issued in January, 1930, and the official program in April, 1930. For further information address the Secretary, A. P. Burkhart, 57 E. Genesee Street, Auburn, N. Y.

The Eastern Association of Graduates of the Angle School of Orthodontia

A regular meeting of the Eastern Association of Graduates of the Angle School of Orthodontia will be held at the Vanderbilt Hotel, New York City, on Monday, January 27, 1930.

The annual meeting will be held in New York City, Monday and Tuesday, May 5 and 6, 1930.

E. SANTLEY BUTLER, Secretary,
576 Fifth Avenue, New York City.

Dallas Mid-Winter Dental Clinic

The Dallas Mid-Winter Dental Clinic will be held February 10-12, 1930, in Dallas. The clinicians for this meeting are Dr. George M. Hollenback, of Los Angeles, crown and bridge work; Dr. R. O. Schlosser, of Chicago, prosthetics; Dr. Thomas P. Hinman, of Atlanta, surgery; and Dr. W. J. Charters, of Des Moines, periodontia.

DR. BROOKS BELL, JR., Secretary,
1810 Medical Arts Building,
Dallas, Texas

Southern California Society for the Study of Gnathostatics

The Southern California Society for the Study of Gnathostatics held a meeting at the offices of Drs. James D. and John R. McCoy, Wilshire, Blvd., Los Angeles, on Monday evening, August 12, 1929. Following dinner, which was served in the office, the meeting was addressed by the guest of honor, Dr. B. E. Lischer, of St. Louis, who gave a very interesting and instructive review of some of the helpful features of gnathostatic diagnosis in orthodontia.

This organization is made up of those orthodontists in Southern California who have become convinced that our old methods of intraoral diagnosis are inadequate and that we must seek additional help if the problem of orthodontic diagnosis is to be adequately solved. They believe that in a very large percentage of the cases orthodontists are called upon to treat, the problem involved is not adequately described by the term "malocclusion." In fact, they are frequently dealing with dentofacial deformities, which in character are complex morphologic deviations, including not only the teeth and alveolar processes, but extending beyond these boundaries and involving the jaws and in many instances some of the external features of the face.

All the members of this group have become sufficiently interested in gnathostatics and photostatics to install the necessary instruments and appliances in their respective offices and use them. As time goes on the membership will doubtlessly be increased, but before anyone is eligible his interest must have been sufficient for him to try out the methods involved.

Those present at this meeting in addition to the guest of honor were Dr. Frank M. Taylor, Pomona; Dr. A. F. Heimlich, Santa Barbara; Dr. Harvey Stryker, Santa Ana; Dr. W. J. Furie, Long Beach; Dr. Aldys Gray, Los Angeles; and Drs. James D. and John R. McCoy, Los Angeles.

Notes of Interest

Dr. Allan G. Brodie desires to announce that he has discontinued the practice of orthodontia in Newark, New Jersey, to accept the post of Assistant Professor of Orthodontia, College of Dentistry, University of Illinois, directing the graduate teaching of orthodontia. He will be associated in private practice with Drs. Frederick B. Noyes and Harold J. Noyes at 30 North Michigan Avenue, Chicago, Illinois.

Dr. A. Claude Broussard, formerly associated with Dr. J. A. Gorman in the practice of orthodontia, announces that his office is now at 1116 Maison Blanche Bldg., New Orleans, La. Practice limited to orthodontia.

Dr. Samuel Herder announces the opening of an office at 133 West 72nd Street, New York City. Practice limited to orthodontia.

Dr. W. P. Hoffman, formerly associated with the late Dr. C. A. Hawley in the practice of orthodontia, announces his succession to the practice, 1624 Eye Street, Washington, D. C.

Dr. Stephen C. Hopkins announces the removal of his office to The Columbia Medical Building, 1835 Eye Street, Washington, D. C. Practice limited to orthodontia.

Dr. W. J. McEwen opened his new office in the Bank of Commerce Building, Corner King and James Streets, Hamilton, Ontario, on October seventh. For practice limited to orthodontia.

Dr. Raphael J. Moolten announces the removal of his office to 57 West 57th Street, New York City. Practice limited to orthodontia.

Dr. F. C. Rogers announces the removal of his office to Missouri Theater Building, St. Louis, Missouri.

Dr. Joseph L. Selden announces the removal of his office to Suite 705 Heyburn Building, Corner of Fourth and Broadway, Louisville, Ky.

Dr. Frederick Lester Stanton and Dr. Edward Mason Griffin announce that they have formed a partnership with offices at 121 East 60th Street, New York, and that they will limit their practice to orthodontia.